



AUTO-RETURN QUARTZ SYNTHESIZER TURNTABLE

MODEL **AP-Q70/C**

ALSO APPLICABLE TO BLACK PANEL MODEL

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SECTION 1

SERVICE MANUAL

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For basic adjustments, measuring methods, and operating principles, refer to GENERAL TECHNICAL MANUAL.

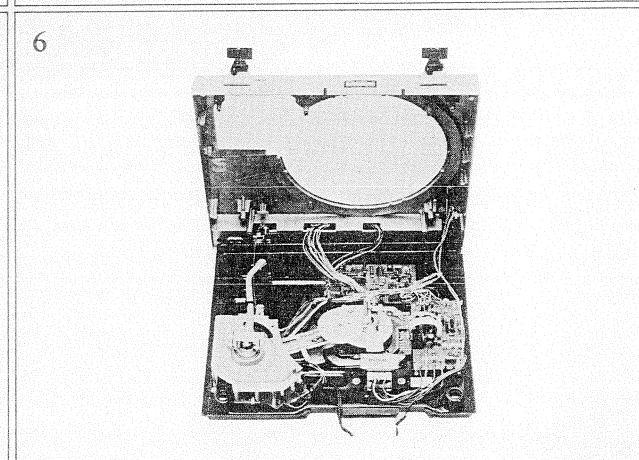
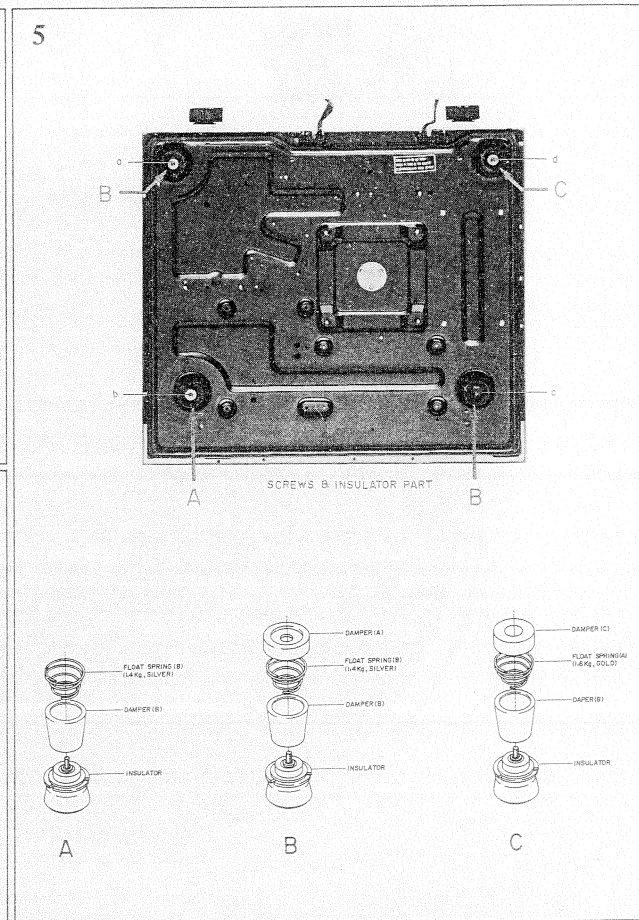
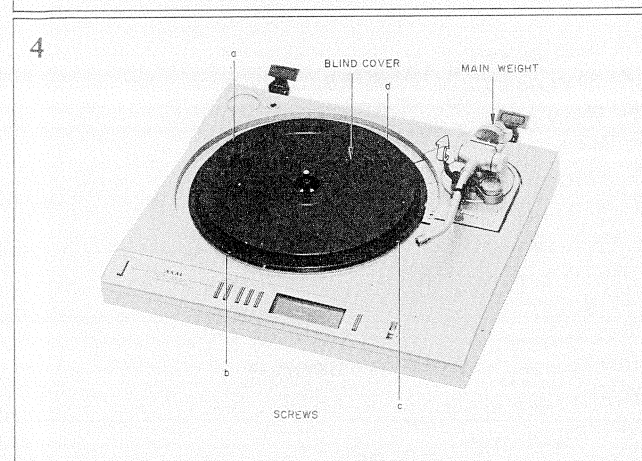
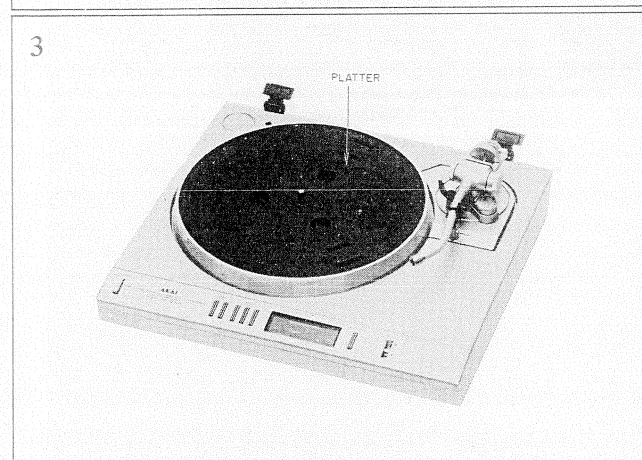
I. TECHNICAL DATA

TURNTABLE	Aluminum alloy diecast
DRIVE SYSTEM AND MECHANISM	Quartz Synthesizer Direct Drive Auto-return
MOTOR	DC Servo Motor
SPEED CONTROL	33-1/3, 45 rpm
PITCH CONTROL	±3% Quartz synthesizer controlled
WOW & FLUTTER	0.035% (DIN), 0.025% (JIS)
RUMBLE	46 dB (DIN A), 74 dB (DIN B), 54 dB (JIS)
SPEED DEVIATION	±0.002%
tone ARM	Dynamic balanced type
EFFECTIVE ARM LENGTH	220 mm
STYLUS PRESSURE ADJUSTMENT RANGE	0 to 2.5 grams
APPLICABLE CARTRIDGE WEIGHT	6 to 14 grams (incl. shell weight)
ARM LIFTER	Oil damped
OVERHANG	15 mm
OFFSET ANGLE	22°30'
HORIZONTAL TRACKING ERROR ANGLE	+3°5', -1°13'
CARTRIDGE	MM Type (Ortofon LMB-12) (Model AP-Q70 does not include cartridge)
OUTPUT VOLTAGE	4.3 mV (DIN 45541)
CHANNEL SEPARATION	More than 28 dB (DIN 45541)
OPTIMAL STYLUS PRESSURE	1.5 grams
STATIC VERTICAL COMPLIANCE	30×10^{-6} cm/dyn
STATIC HORIZONTAL COMPLIANCE	31×10^{-6} cm/dyn
ANTI-SKATING ADJUSTER	Magnet type
POWER REQUIREMENTS	120V, 60 Hz for Canada and USA 220V, 50 Hz for Europe except UK 240V, 50 Hz for UK and Australia 110-120/220-240V, 50/60 Hz for the other countries
POWER CONSUMPTION	10 W
DIMENSIONS	440(W) × 140(H) × 400(D) mm (17.3 × 5.5 × 15.8 inches)
WEIGHT	9.8 kg (21.6 lbs)

* For improvement purposes, specifications and design are subject to change without notice.

II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.



NOTE: To level and the turntable, the strength and arrangement of the insulator blocks differ. Install the insulator blocks as shown in the figure.

I. CONTROLS

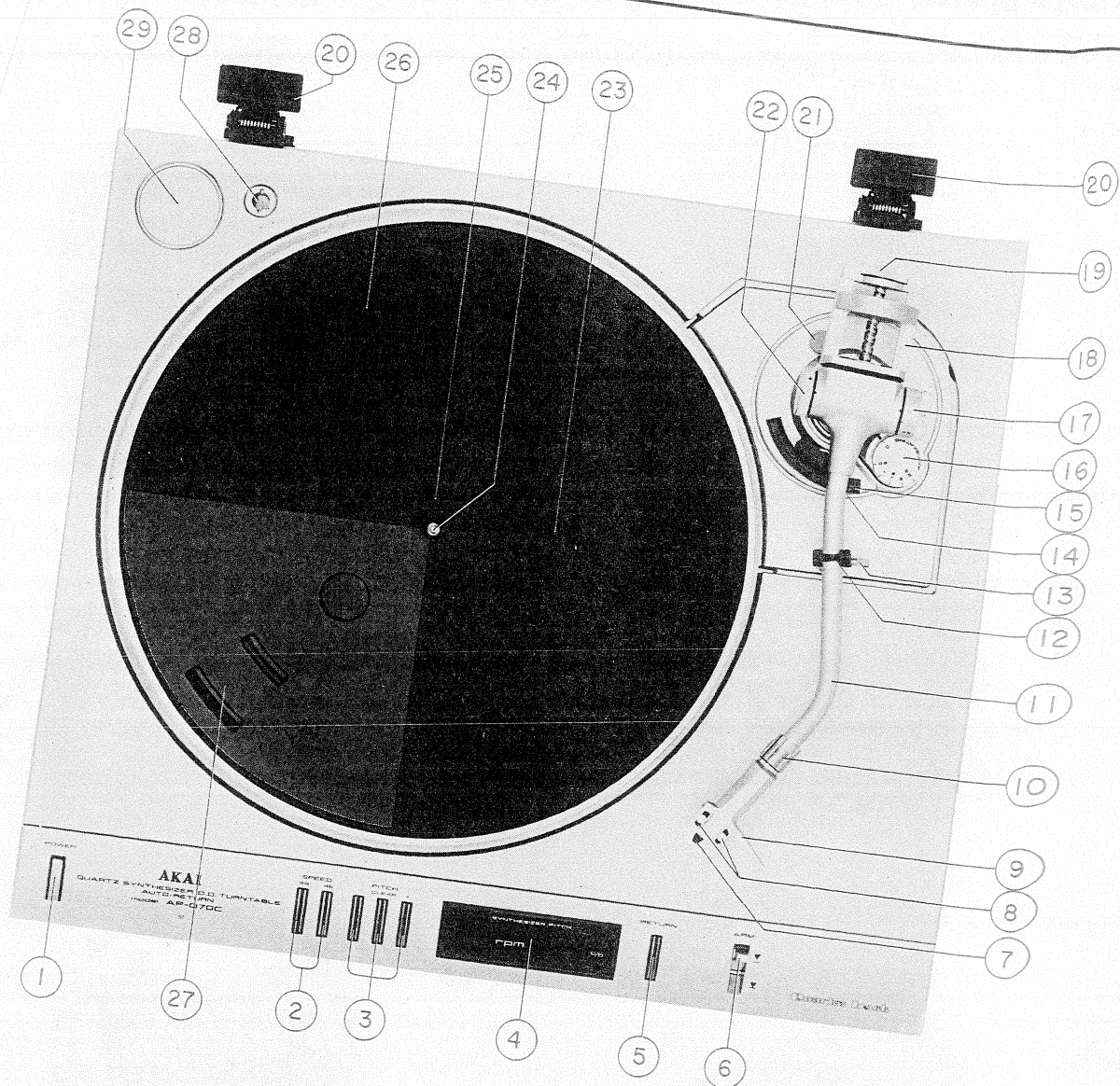


Fig. 1 Controls

1. POWER SWITCH
2. SPEED SELECTOR KEYS (33-45 rpm)
3. PITCH CONTROL KEYS
4. DIGITAL SPEED/PITCH DISPLAY
5. RETURN KEY
6. ARM LIFTER LEVER
7. CARTRIDGE SHELL
8. CARTRIDGE RE-SETTING SCREWS
9. CARTRIDGE SHELL FINGER LEVER
10. LOCKING NUT
11. TONE ARM
12. TONE ARM REST AND LOCK
13. TONE ARM REST HEIGHT ADJUSTMENT SCREW
14. TONE ARM LIFTER ELEVATION ADJUSTMENT SCREW
15. TONE ARM LIFTER

16. ANTISKATING ADJUSTER
17. STYLUS PRESSURE ADJUSTER
18. MAIN WEIGHT ASSEMBLY
19. MAIN WEIGHT ADJUSTMENT KNOB
20. HINGES (for DUST COVER)
21. AUTO-RETURN ADJUSTMENT SCREW CAP
22. MAIN WEIGHT ASSEMBLY LOCK KNOB
23. AUTO-RETURN ADJUSTMENT GROOVE
24. SPINDLE
25. OVERHANG ADJUSTMENT GROOVE
26. RUBBER MAT
27. TURNTABLE PLATTER
28. CARTRIDGE SHELL HOLDER
29. 45 rpm ADAPTER HOLDER

IV. PRINCIPAL PARTS LOCATION

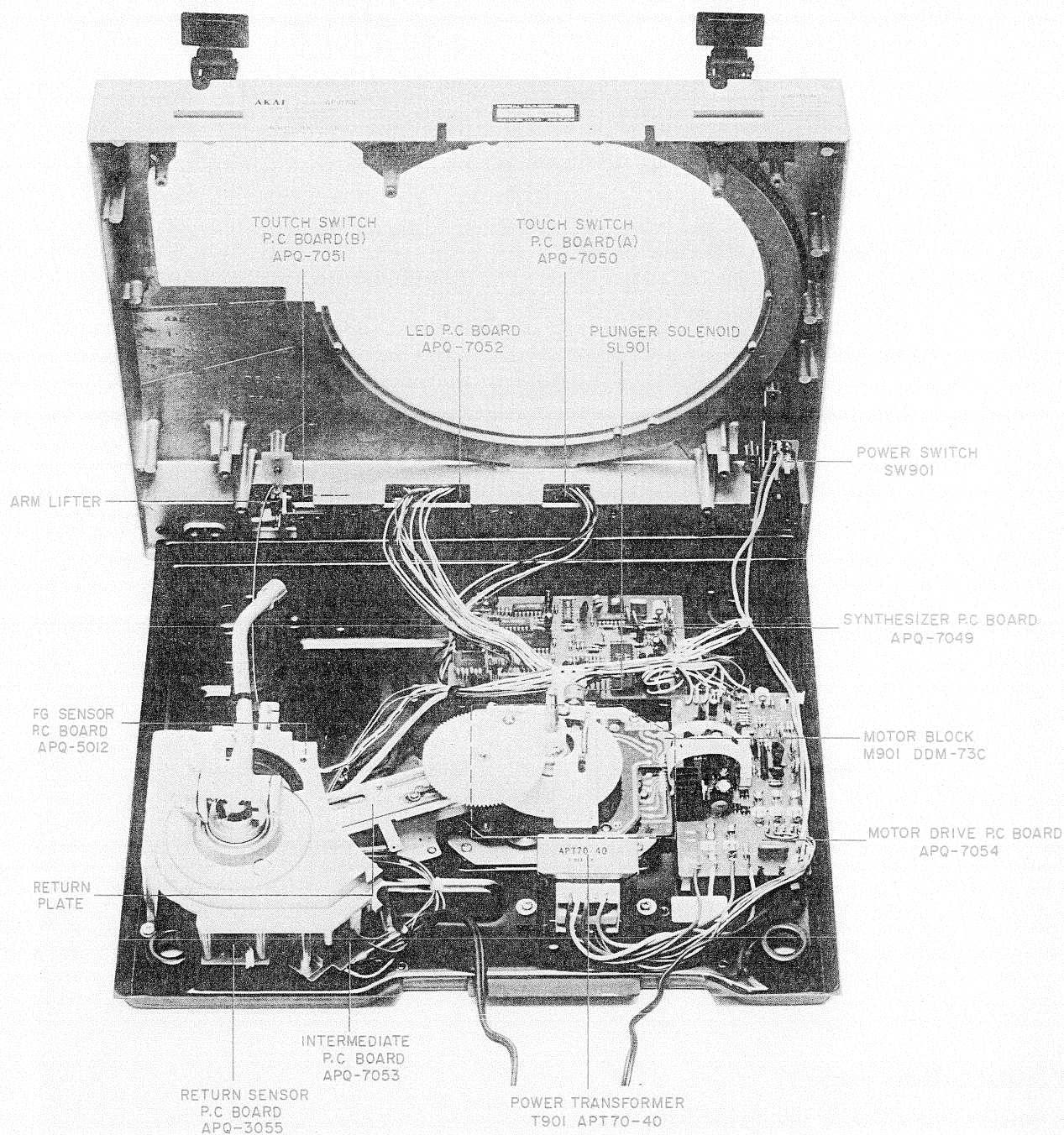


Fig. 2

IV. PRINCIPAL PARTS LOCATION

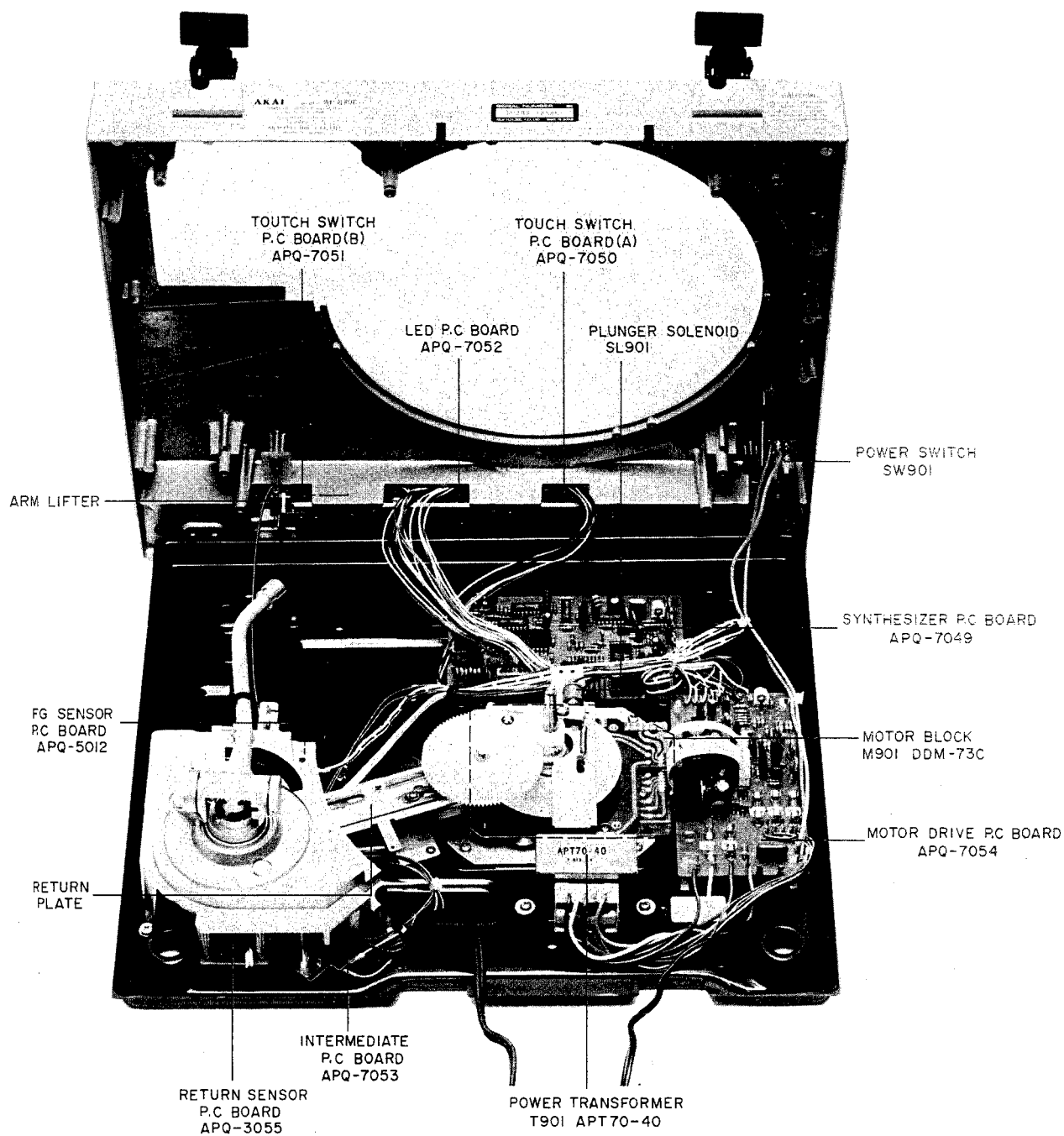


Fig. 2

V. VOLTAGE CONVERSION

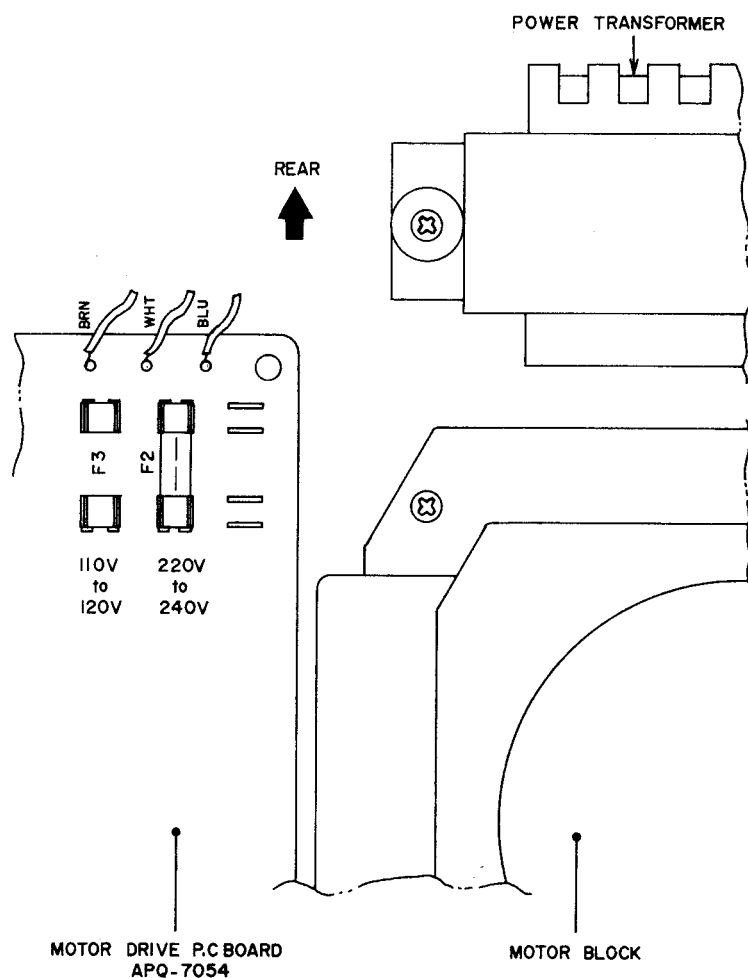


Fig. 3 Voltage Conversion (U/T Model only)

1. U/T MODEL (Refer to Fig. 1)

This unit can be set to 110–120 or 220–240V as required.

Each machine is preset at the factory according to its destination. However, if voltage conversion is necessary, it is accomplished as follows:

1. Remove power cord from mains supply.
2. Loosen holding screws and remove the motor cover.
3. Remove existing Line Voltage Fuse and insert required line Voltage Fuse in the proper fuse holder.

F3: 110V to 120V T400mA

F2: 220V to 240V T400mA

2. MODELS OTHER THAN U/T

No voltage conversion.

VI. BLOCK DIAGRAM

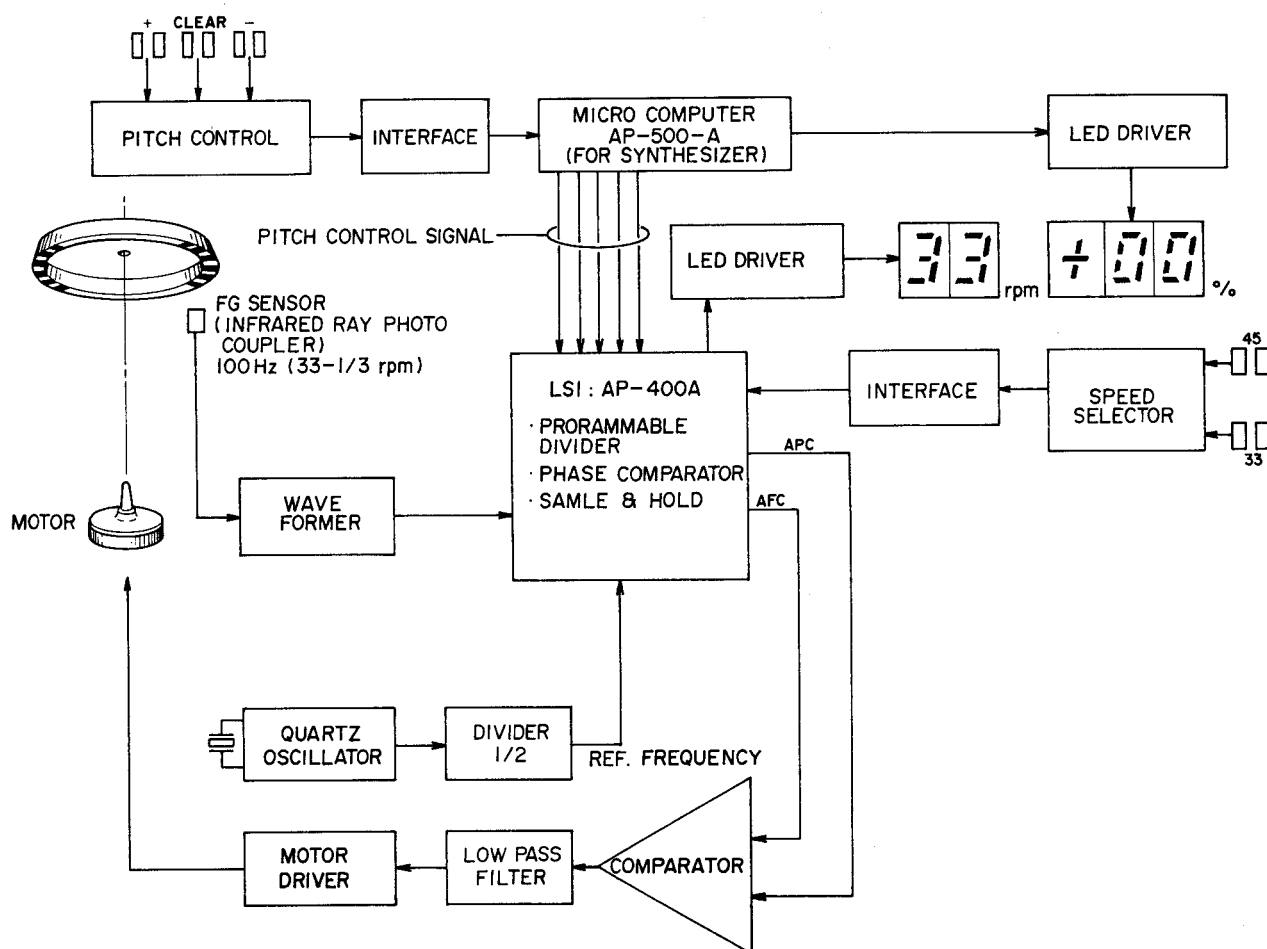


Fig. 4

VII. EXPLANATION OF HOW THE COMPUTER WORKS

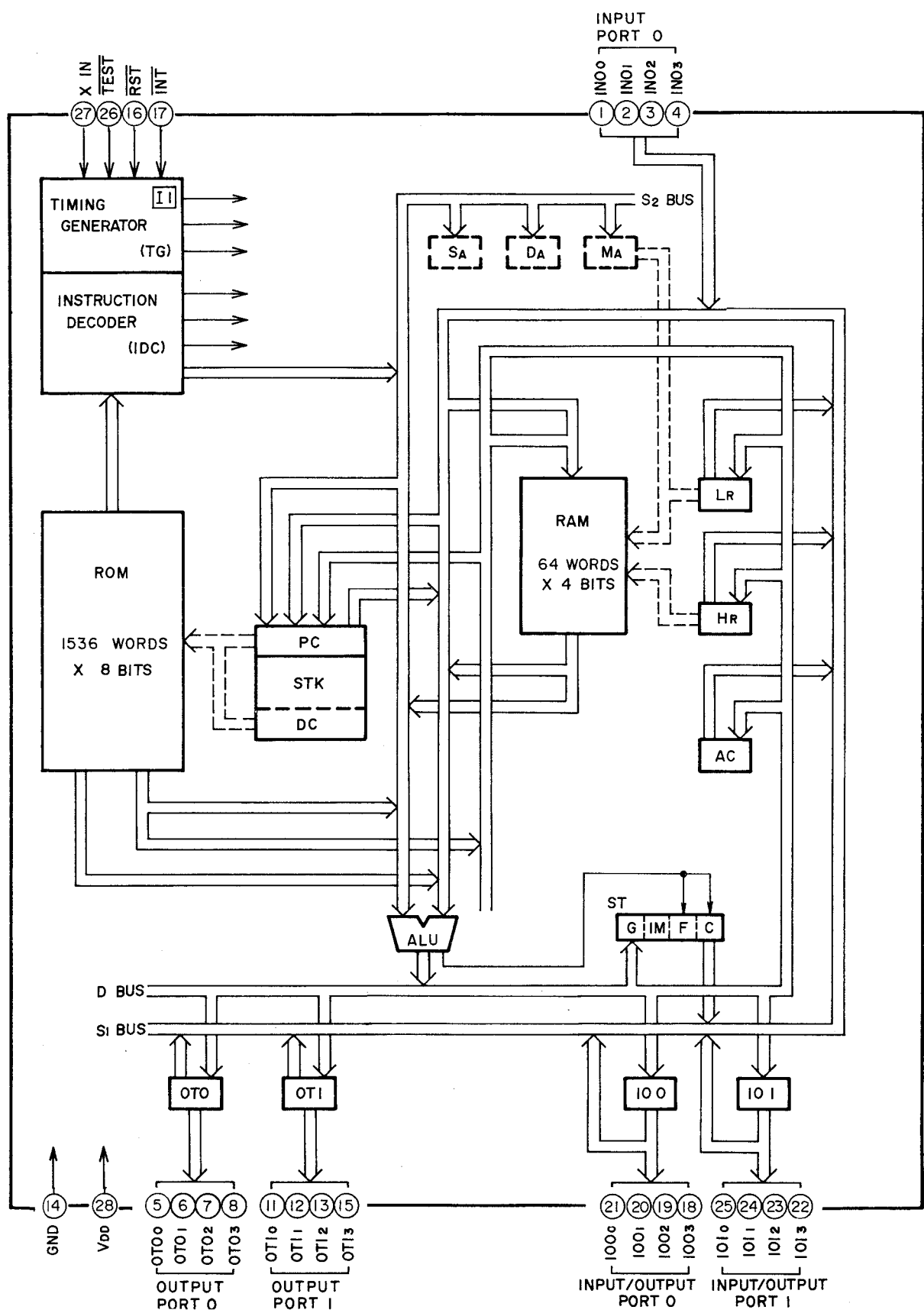


Fig. 5 Block diagram

1. TOUCH SWITCH SENSOR AND INDICATOR

The IC1, AP-500-A on the synthesizer p.c board plays the central role in sensing and displaying the states of the touch switches.

AP-500-A is a 4-bit microprocessor operating with 35 instructions, to sense and evaluate the states of the touch switches; display rpm and pitch data; and feed these data to the PLL LSI (AP-400-A) which controls the drive system.

Fig. 5 is the block diagram of AP-500-A, which has ① input terminal, ② output ports, and ③ input/output ports. AP-500-A receives and processes data coming through the input ports and delivers appropriate information to the output ports based on the programs stored in its ROM (read only memory) and assisted by the registers and the RAM (random access memory).

The input and output ports are connected with switches and LEDs via interfaces. Execution of the programs proceeds, synthonized by a clock pulse, in a fixed sequence which follows POWER ON RESET or by the regular timer insertions.

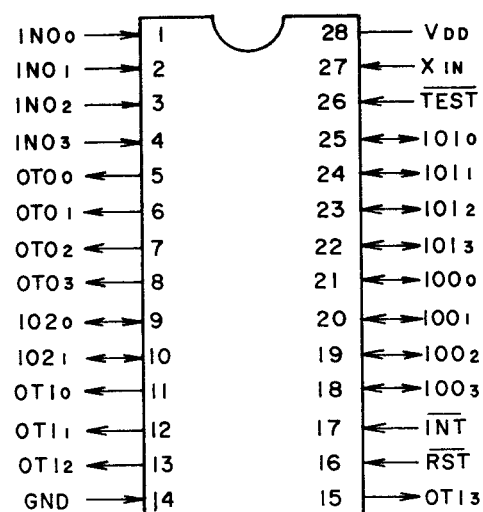


Fig. 6 Pin Configuration

Pin No.	Pin Name	Function	Pin No.	Pin Name	Function
1	IN0 ₀	(LSB)	28	V _{DD}	Power Supply (5V)
2	IN0 ₁	INPUT PORT 0	27	X _{IN}	Clock input
3	IN0 ₂	4 bit parallel input	26	$\overline{\text{TEST}}$	Test terminal
4	IN0 ₃	(MSB)	25	IO1 ₀	(LSB)
5	OT0 ₀	(LSB)	24	IO1 ₁	INPUT/OUTPUT PORT 1
6	OT0 ₁	OUTPUT PORT 0	23	IO1 ₂	4-bit parallel input/output
7	OT0 ₂	4-bit parallel output	22	IO1 ₃	(MSB)
8	OT0 ₃	(MSB)	21	IO0 ₀	(LSB)
9	IO2 ₀	(LSB) INPUT/OUTPUT PORT 2	20	IO0 ₁	INPUT/OUTPUT PORT 0
10	IO2 ₁	(MSB) 2-bit parallel input/output	19	IO0 ₂	4-bit parallel input/output
11	OT1 ₀	(LSB)	18	IO0 ₃	(MSB)
12	OT1 ₁	OUTPUT PORT 1	17	$\overline{\text{INT}}$	Interrupt request
13	OT1 ₂	4-bit parallel output combined with 15 pin	16	$\overline{\text{RST}}$	Reset terminal
14	GND	Ground (0V)	15	OT1 ₃	(HSB)

Chart 1

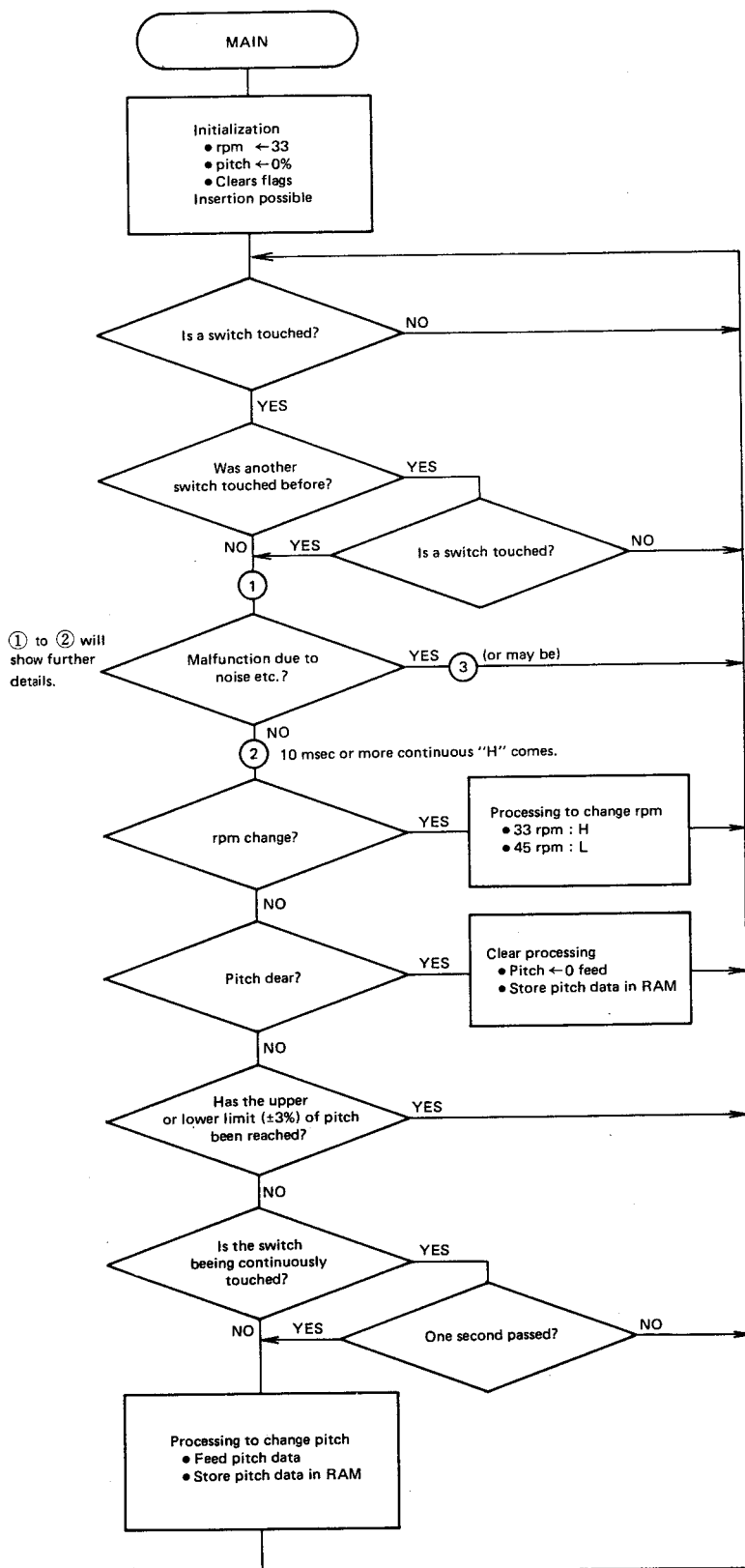


Fig. 8 Main Routine

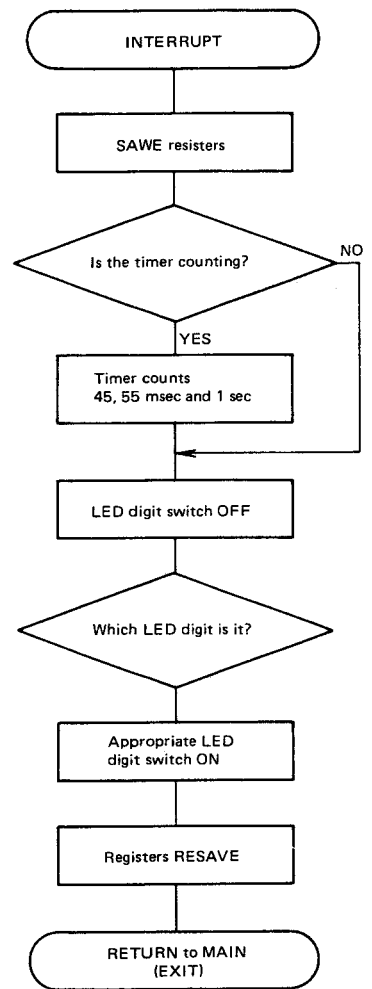


Fig. 9 Interrupt Routine

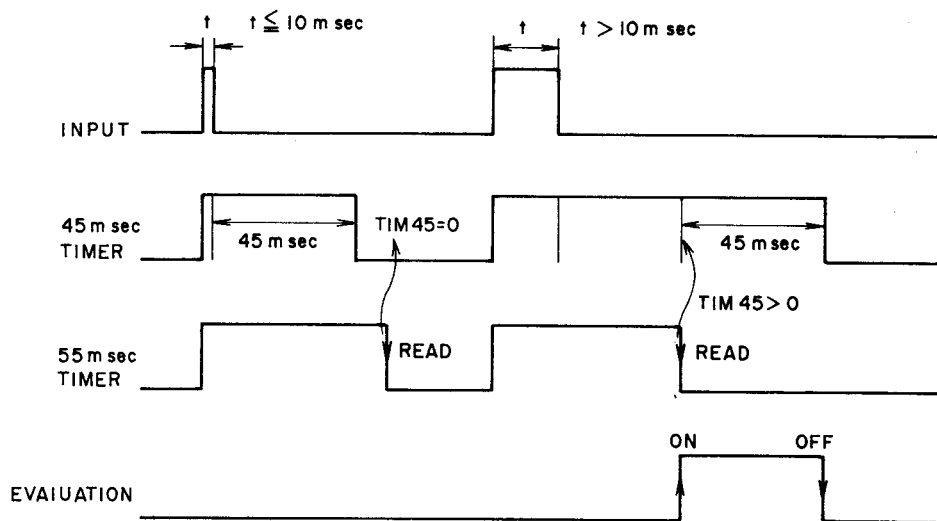


Fig. 10

1-1. Main program

When turning on the POWER switch, due to the time constant delay R33/C17 in the power supply mounted on the MOTOR DRIVE PCB (printed circuit board) the voltage at the RST terminals rises delayed from V_{DD} . Because of this RESET reaches the L level so that the main program starts by RESET JUMP.

The main program initializes the parameters of rpm and pitch and sets up the input and output ports, and then enters an endless loop in which it senses and evaluates the states of the touch switches during insertion, and feeds data about pitch etc. to the output ports.

Detection and evaluation of the ON state of a touch switch are carried out as described below.

The high input impedance of the CMOS inverter is employed to sense the state of a touch switch. The input of IC5 is brought to H level by a high value resistor. When the finger shorts the terminals of a switch, the input terminal of the associated inverter becomes "L" and the inverted output signal (H) is fed to an input port of AP-500-A. The main program detects the "H" level in the endless loop. The touch switch has a high impedance exposed and thus is liable to noise pick up. To cope with this problem, only an "H" level which is sustained for 10 msec or more is regarded as an input signal resulting from proper touch. The "H" level which is not kept for at least 10 msec is regarded as a result of noise. This scheme prevents the circuits from operating improperly, i.e. sensing false signals, due to hum

induced the line frequency of 50 Hz (20 msec) or other pulse noises.

No input signals but CLEAR will be accepted for at least 100 msec after the occurrence of a proper touch input signal (or within 45 msec after switch-off).

Fig. 11 is the flowchart of detection and evaluation of input signals.

When the system detects that an input port is at the "H" level, a constant is stored in a certain portion of RAM and the timers are started (refer to the section of interrupt processing program). There are two types of timers: on (TIM45) counts in intervals of 45 msec and the other (TIM55) in intervals of 55 msec. TIM55 starts when "H" has been detected for the first time. TIM45 starts each time when "H" is detected in the loop (the cycle of the loop is very short compared with the cycle of interrupt). (TIM45 turns "0" in 45 msec after turn-off). A switch is judged turned on if the system finds TIM45 operating ($TIM45 > 0$) after TIM55 stops ($TIM55 = 0$). At this time, duration of the touch on the switch must be 10 msec or more.

When a proper input signal comes in, TIM45 start again when TIM45 is not zero, no input signals but CLEAR will be accepted for 45 msec after an input turns from "H" to "L". This eliminates the effect of chattering when a switch is turned off. Fig. 10 illustrate this operation.

The main program also controls malfunction of the timers and deals with the cases when one more than one switch are touched at the same time and when the pitch switch is kept depressed. Details are not explained. Refer to the flowcharts of Figs. 8 and 9.

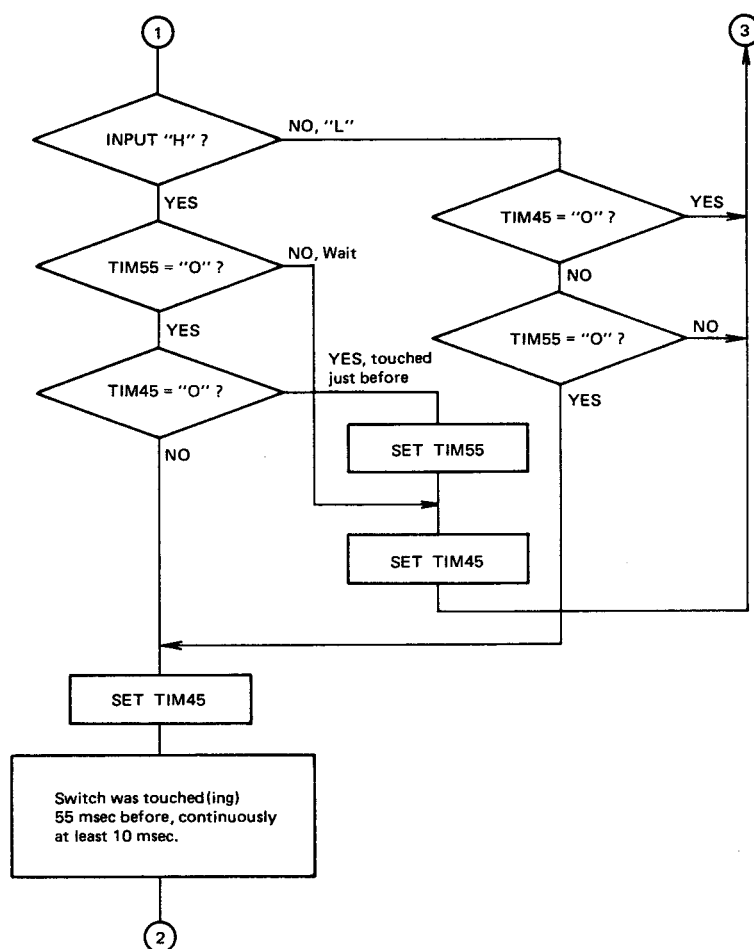


Fig. 11

By the procedure described above, modified data of pitch and rpm are sent to the output ports.

Pitch data are sent as a 4-bit binary number (000(0) ~ 1111(15)) to pins ⑧ through ⑪ of AP-400-A via port OT. A minus flag ("H" when minus) is sent

to pin ⑫ from port OT1. Chart 2 shows the relations between pitch and binary data. The output data are latched until the arrival of new data, and they can be checked using a tester.

Pitch % Pin	0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.0
⑤ (LSB)	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H
⑥	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H
⑦	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H
⑧ (MSB)	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
⑪	plus 0, minus 1															

Chart 2

1-2. Interrupt processing program

The waveform shown in Fig. 12 is applied to pin ⑰ of terminal $\overline{\text{INT}}$ from the oscillator circuit of IC6. As terminal $\overline{\text{INT}}$ falls from "H" to "L", the CPU interrupts execution of the main program and changes to the interrupt processing routine. Since the waveform applied to $\overline{\text{INT}}$ rises and falls in intervals of approximate 4 msec (250 times per second), the interrupt processing routine runs regularly in the same intervals.

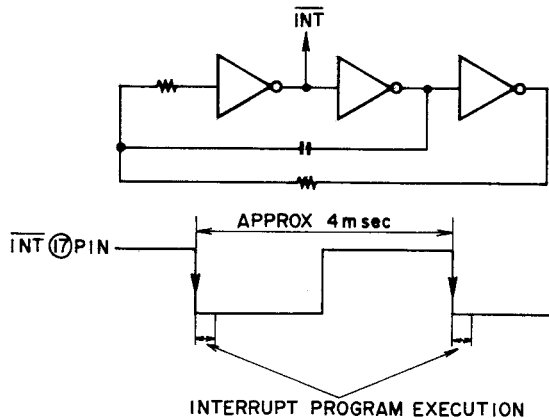


Fig. 12 $\overline{\text{INT}}$ Signal Oscillator and Waveform

The interrupt processing routine controls the timers and pitch LEDs according to the main program.

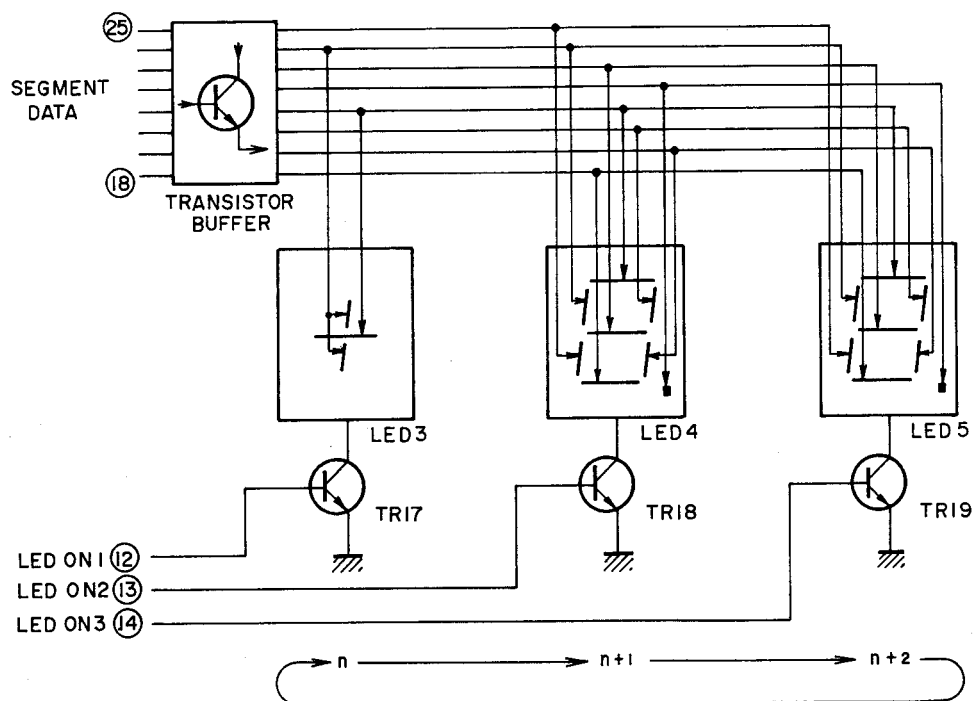
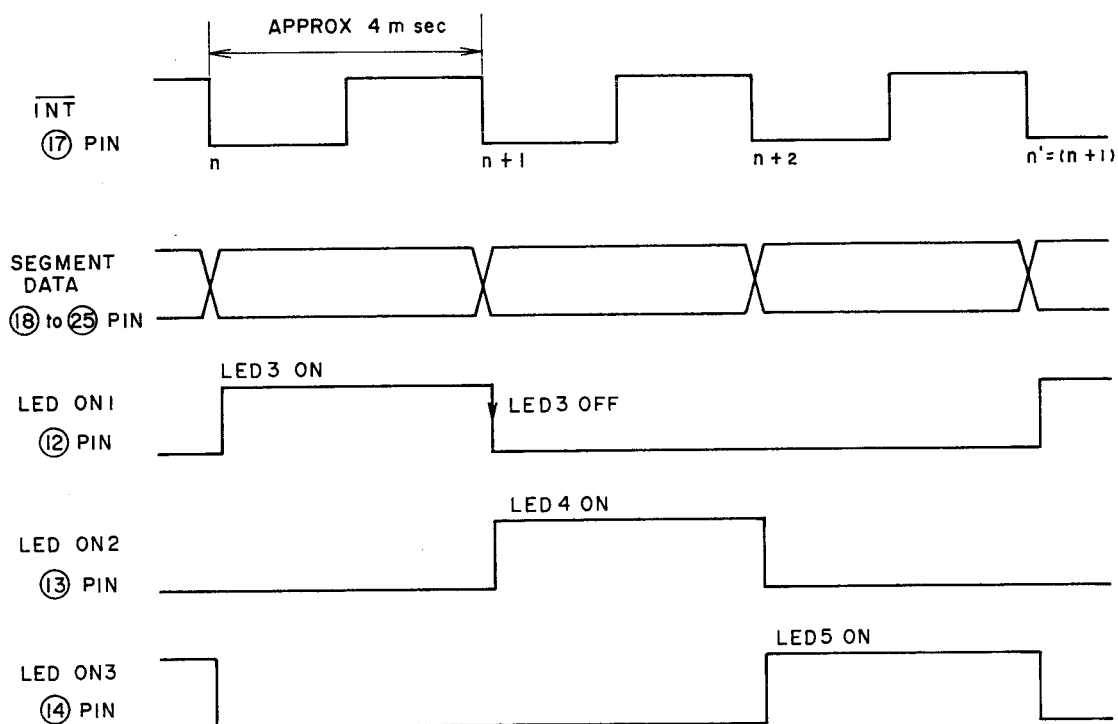
The routine reads the contents of a fixed location in RAM. If the data is not zero, the routine decreases it by one and stores the result in the same location. Fig. 13 shows the hardware and timing diagram of the pitch LED.

An interrupt cycle is divided into three periods of n , $n+1$, and $n+2$ drive the 3-digit LED display dynamically.

A 2-bit register is used and the pitch data is converted to the corresponding LED segment data (8 bits: 7 segments + period) before it is delivered to pins ⑱ through ⑳ of output ports IO1 and IO0, and signal LED ON for the ground common terminals of the LEDs is sent to output port OT1.

At each interrupt, LED3, LED4, and LED5 are lighted in turns. Due to the high speed of the cycle, the LEDs look like being lit constantly.

When "3" or "45" is displayed (with LED1 and LED2), data of 33 = "H" and 45 = "L", which are fed out via pin 10 by the main program, and data of 33 = "L" and 45 = "H", fed via AP-400-A, switch TR3 or TR4 to select the respective segments to be lit. At this time, signal LED ON1 at pin 12 is applied to TR5 so that the LEDs are lit only during cycle n (at the same time as LED3).



PIN CONNECTION

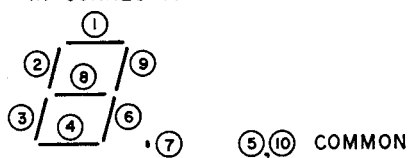


Fig. 13

VIII. EXPLANATION OF HOW THE SERVO CIRCUIT WORKS

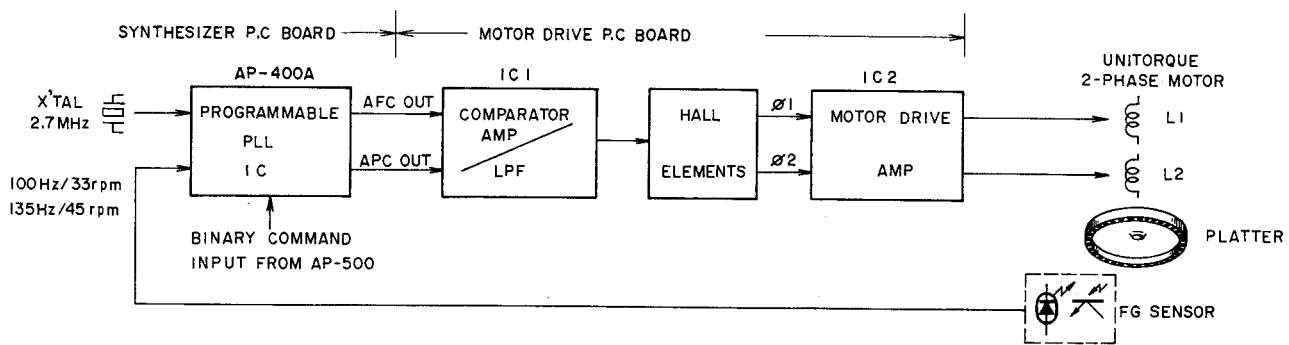


Fig. 14 Motor Servo Phase Lock Loop Diagram

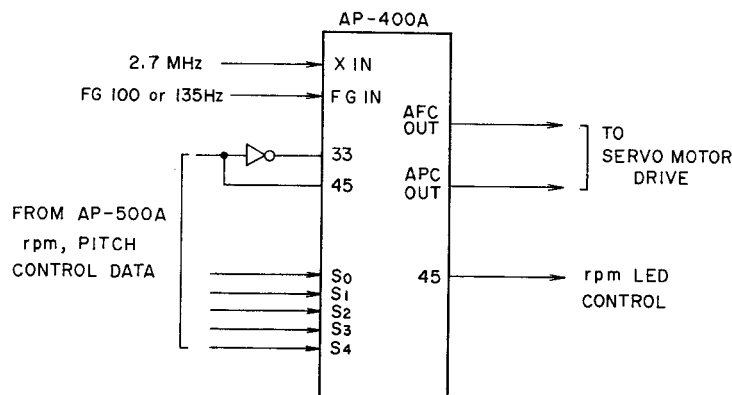


Fig. 15

Fig. 14 is the block diagram of the motor servo circuit. AP-400-A is a synthesized PLL LSI which compares a reference signal supplied by a quartz oscillator and the revolution speed signal detected by the FG sensor with reference to the rpm and pitch data (binary numbers) supplied by AP-500-A.

And it generates the voltages AFC OUT and APC OUT which are proportional to the revolution speed and the phase difference respectively.

Fig. 15 shows the input and output signals. Figs. 16 and 17 show the pin assignments and the block diagram of the LSI.

A photocoupler detects light reflected from the strobe pattern on the bottom of the platter. The FG frequency is 135 Hz at 45 rpm and 100 Hz at 33-1/3 rpm.

The reference frequency is 2.7 MHz which is generated by dividing the base frequency of 5.4 MHz by two.

Rpm is selected by making terminals 33IN or 45IN at "L".

For pitch control, the 4-bit binary number of S0 (LSB) to S3 (MSB), with a minus flag set up in S4, determines pitch in the range of 0% to 3% in steps of 0.2%. For

details, see Chart 2 in Section 1, "Touch switch sensor and indicator".

APC OUT and AFC OUT are obtained by sampling and holding momentary values of a sawtooth wave which is generated by integrating a square wave with an external capacitor. The peak level of the sawtooth wave is proportional to the DC voltages applied to pins ⑩ and ②②.

APC OUT and AFC OUT are applied to the comparator-amplifier of IC1 on the motor drive PCB and then applied to the base of TR1, via a low-pass filter, to control the collector current. This current is applied to a Hall element, ensuring that the output current of 2-phase motor drive amplifier IC2 is also proportional to it.

The motor drive amplifier IC2 is designed to have a frequency response which falls at low frequencies due to negative feedback given through a C-R circuit.

And so, the gain of the amplifier is reduced to protect the motor coil from excessive current when the motor coil is locked.

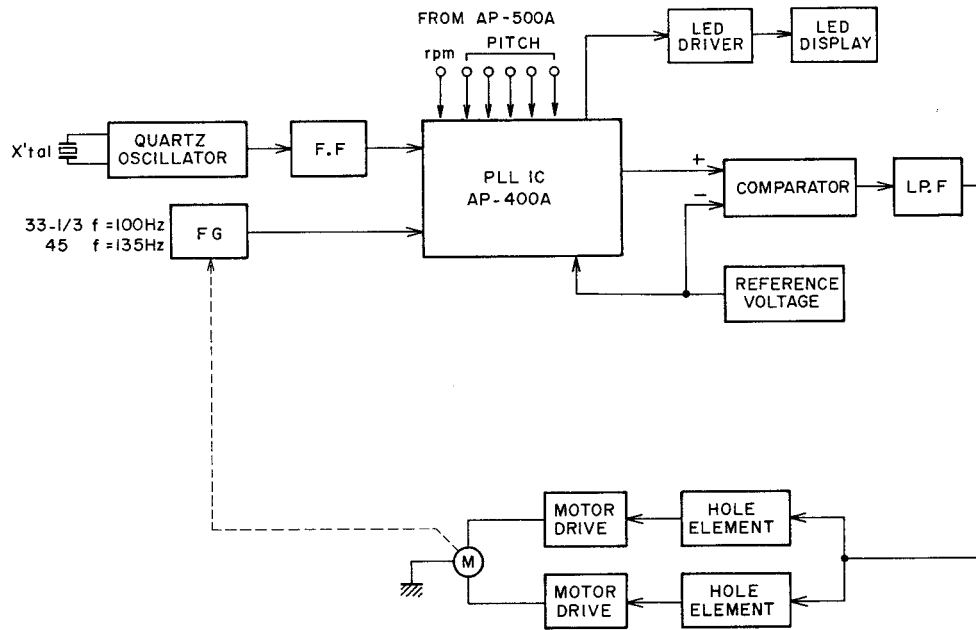


Fig. 16 Block Diagram

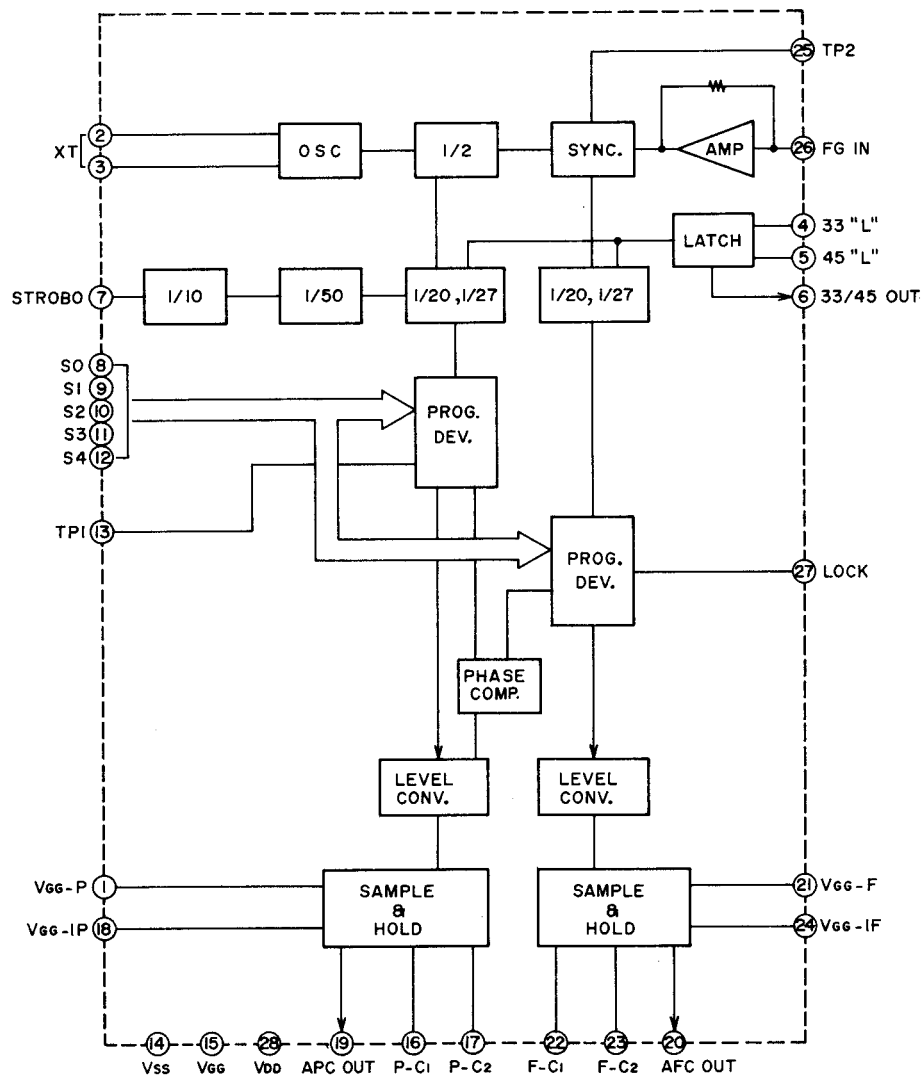


Fig. 17 Pin Connection

IX. EXPLANATION OF HOW THE DC BRUSHLESS DD MOTOR (DDM-73C) WORKS

In the DD motor of AP-Q70/C, a Hall switching element is used to generate a smooth sine wave-like rotating magnetic field and to eliminate noise which conventional brushes might generate. In addition, use of 2-phase coils reduces variation of the driving torque which would otherwise vary with the rotor position, thus ensuring smooth rotation. Operation of the DDM-73C is briefly described below.

Fig. 18 shows the structure of the DDM-73C which is composed of 2-phase, star-shaped coils, eight magnetized rotor poles in NS alteration and the Hall devices at angles of 112.5°.

The Hall devices detect the sinus wave-like variation of the magnetic field occurring when the rotor rotates, and supply the coils with amplified drive currents.

Let us see how one of the coils works. Force F which the coil receives when current i flows (the magnetic pull becomes the actual driving torque) is as follows.

$$F = Bil$$

Where B is the flux density, and l the length of the coils which move across the magnetic flux.

The force (vector), which varies with the relative position of the coils and magnets, reaches a maximum in the case shown in Fig. 19-A and is cancelled in the case shown in Fig. 19-B.

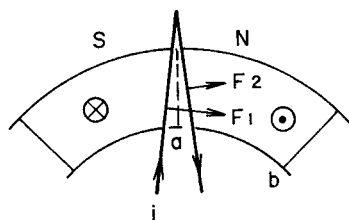


Fig. 19-A

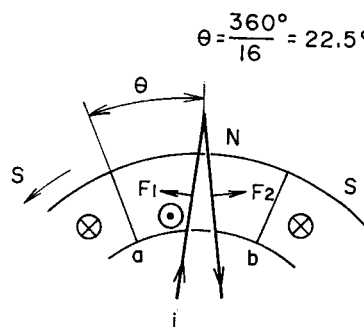


Fig. 19-B

The star shape of the coils causes the force to vary smoothly from maximum (case A) to minimum (case B) in the form of a sine wave. The variation of the force has a cycle which is equal to a quarter rotation, so the driving torque $T1$ with K as a constant is expressed as follows.

$$T1 = K \cdot i \cdot \sin 4\theta \dots\dots\dots ①$$

On the other hand, current i counteracts variation of the magnetic field thus the following relation with I as a constant holds.

$$I = \sin 4\theta \dots\dots\dots ②$$

Thus, equations ① and ② give rise to

$$T1 = K \cdot I \cdot \sin^2 4\theta \dots\dots\dots ③$$

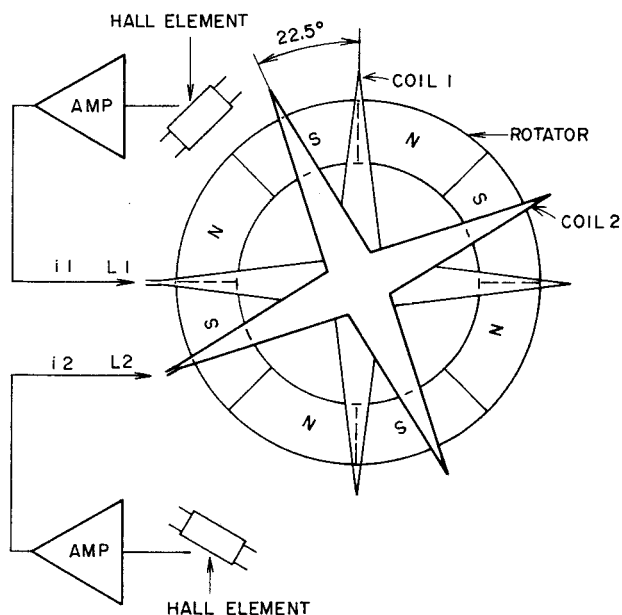


Fig. 18

Fig. 20 shows this situation.

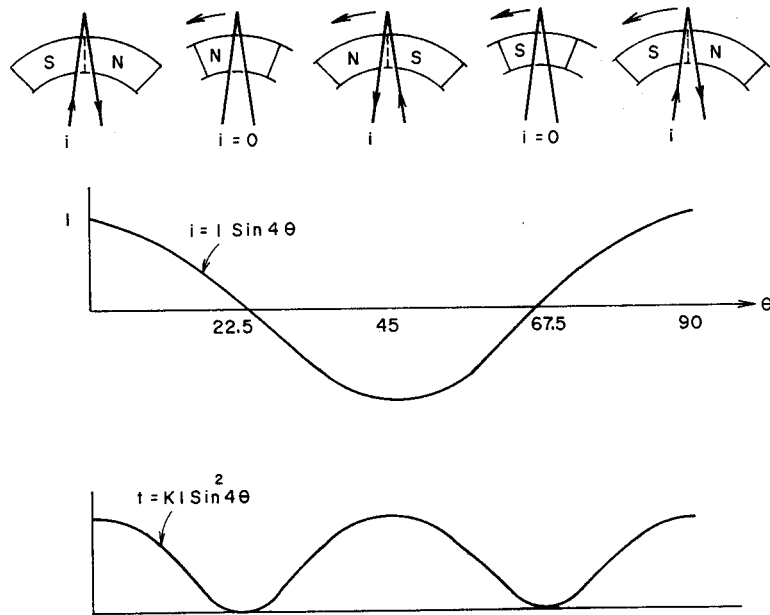


Fig. 20

The other coil is installed with a phase difference of $\pi/2$ (actually at an angle of 22.5°) to the first, and the positions of the associated Hall elements are shifted accordingly. So, current i_2 which flows through the second coil is:

$$i_2 = I \cos 4\theta \dots\dots\dots (4)$$

Driving torque T_2 is:

$$T_2 = K \cdot i_2 \cos 4\theta \dots\dots\dots (5)$$

Hence, from equations (4) and (5), we have:

$$T_2 = K \cdot I \cos 4\theta \dots\dots\dots (6)$$

Total driving torque, which is the sum of T_1 and T_2 , is expressed as follows.

$$T_0 = T_1 + T_2 = K \cdot I (\sin^2 4\theta + \cos^2 4\theta) = K \cdot I$$

Thus the composite torque remains constant independently of the angle of rotation as shown in Fig. 21.

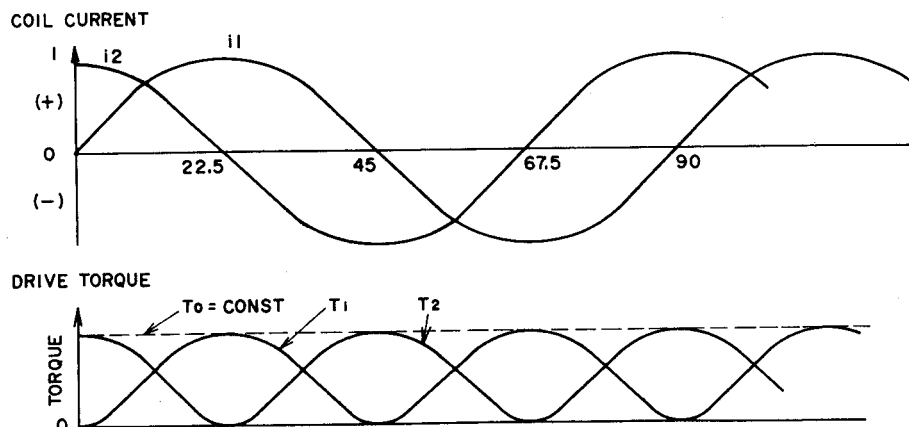


Fig. 21

X. ELECTRICAL ADJUSTMENT

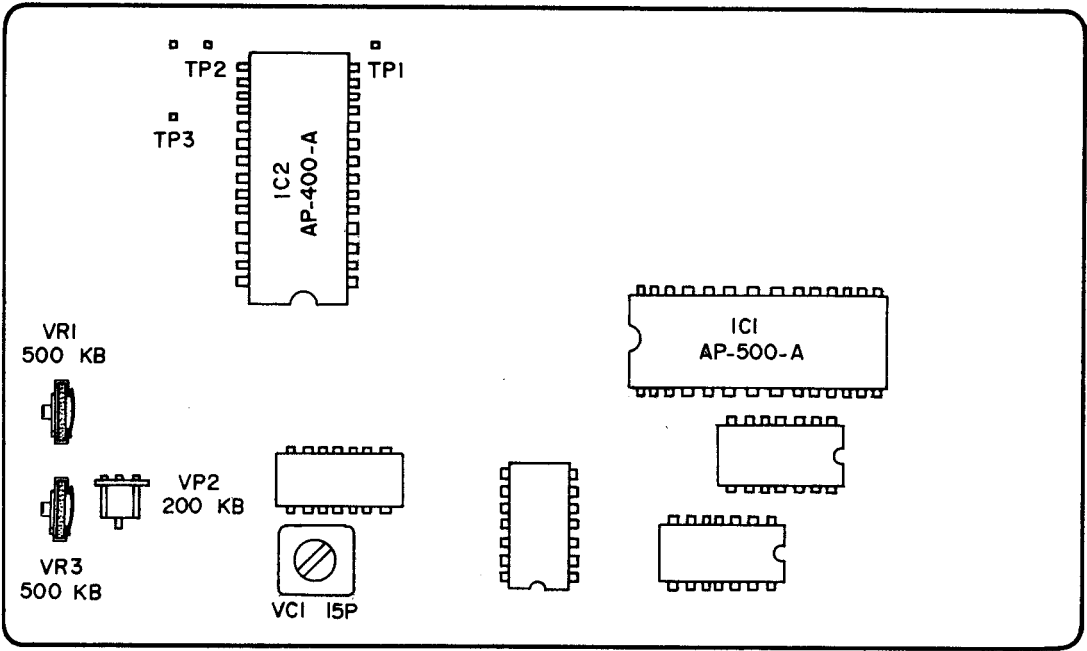


Fig. 22 Synthesizer P.C Board

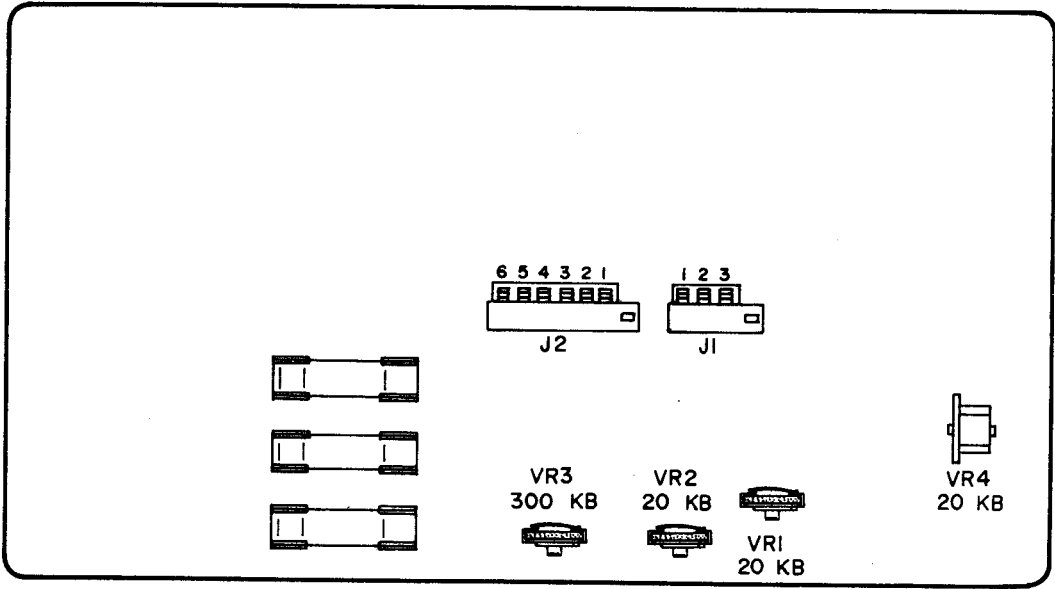


Fig. 23 Motor Drive P.C Board

1. X'TAL OSCILLATION FREQUENCY

ADJUSTMENT (Refer to Fig. 22)

- 1) Connect a frequency counter to IC2 (AP-400-A)'s pin ② terminal.
- 2) Turn the power switch ON.
- 3) Adjust VC1 (15P) until the frequency counter reads $2.7 \text{ MHz} \pm 10 \text{ Hz}$.

2. QUARTZ LOCK ADJUSTMENT

(Refer to Figs. 22, 24)

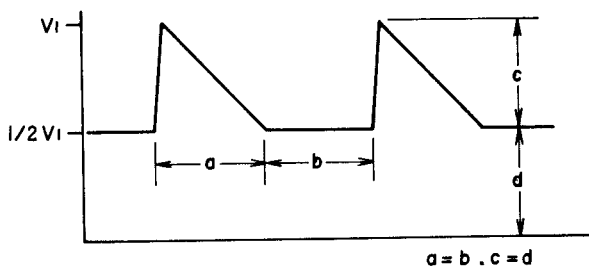


Fig. 24

- 1) Set the speed selector to 45 rpm and turn the power switch ON.
- 2) Move the tone arm to rotate the platter.
- 3) Connect an oscilloscope to test point TP3.
- 4) Adjust VR1 (500 k Ω) and VR3 (500 k Ω) to give the waveform shown in Fig. 24. Please move and adjust both volume controls as there is a tendency for the VR1 to change voltage and VR3 to change tilt.

3. OFF-SET VOLTAGE ADJUSTMENT AND TORQUE DIFFERENCE ADJUSTMENT

(Refer to Fig. 23)

- 1) Remove the platter.
- 2) Disconnect the motor connection wires to J1 and J2.
- 3) Short J1 pins ①, ④ and ⑥.
- 4) Connect an oscilloscope to J1 pin ① and adjust VR1 (20 k Ω) to give DC $-205 \text{ mV} \pm 5 \text{ mV}$.

5) Short J2 pins ③, ④ and ⑤.

6) Set VR3 (300 k Ω) to the centre.

7) Connect an oscilloscope to J1 pin ③ and adjust VR2 (20 k Ω) to give DC $-205 \pm 5 \text{ mV}$.

8) Re-connect the motor connection wires to J1 and J2.

Connect a 2ch AC voltmeter to J1 pins ①, ② (GND) and ③.

9) Replace the platter and move the tone arm to rotate the motor (45 rpm).

10) Adjust VR3 (300 k Ω) until the deflection of the AC voltmeter is the same.

NOTE: 1. The power switch should be off while shorting the terminals or disconnecting connection wires.

2. After adjustment, playback the 3,000 Hz test record and confirm that the Wow and Flutter is less than 0.025% (JIS).

If out, re-adjust VR1 to 3.

4. PHASE ANGLE ADJUSTMENT

(Refer to Figs. 22, and 25)

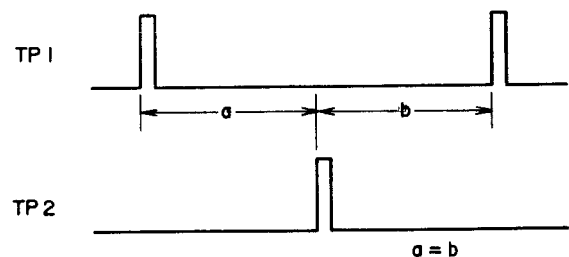


Fig. 25

- 1) Turn the power switch ON.
- 2) Set the speed selector to 45 rpm and move the tone arm to rotate the platter.
- 3) Connect the oscilloscope CH1 to TP1 and CH2 to TP2.
- 4) Adjust VR4 (20 k Ω) until waveform TP2 comes to the centre of waveform TP2.

XI. MECHANICAL ADJUSTMENT

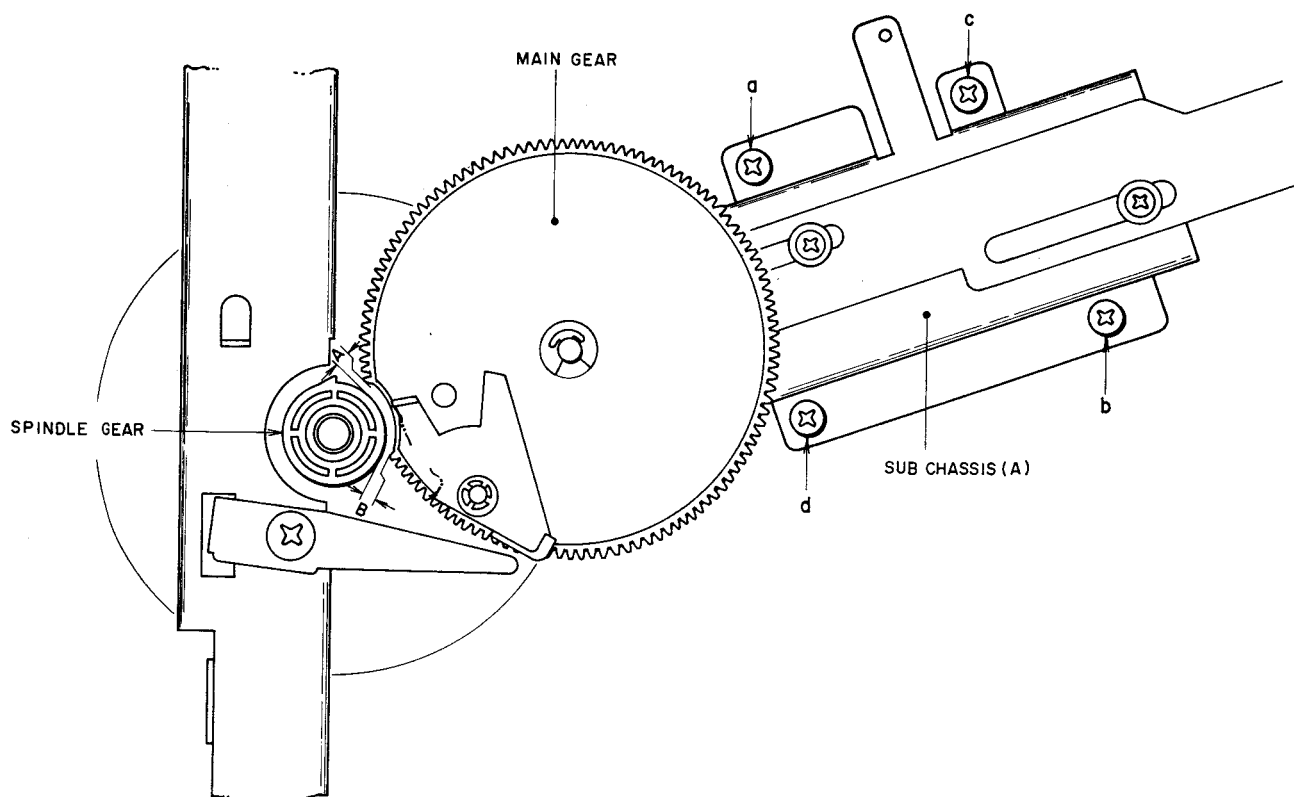


Fig. 26

1. THE MAIN GEAR INSTALLATION POSITION CHECKING (Refer to Fig. 26)

With the motor free, confirm that the gaps A and B between the spindle gear and main gear are equal. If not, loosen screws (a) to (d), move the sub chassis (A) and then tighten again.

2. RETURN PLUNGER INSTALLATION POSITION ADJUSTMENT (Refer to Fig. 27)

Depress the reject lever with a finger until the reject plate touches the spindle gear. See Fig. 27. Now, in this position, move the plunger (SL901) and adjust the installation screw until gap A between the reject lever and plunger is 0 to 0.5 mm. Turn the hook to which the spring is attached because sometimes the reject lever is not pulled back when the plunger is operated if the spring is too strong.

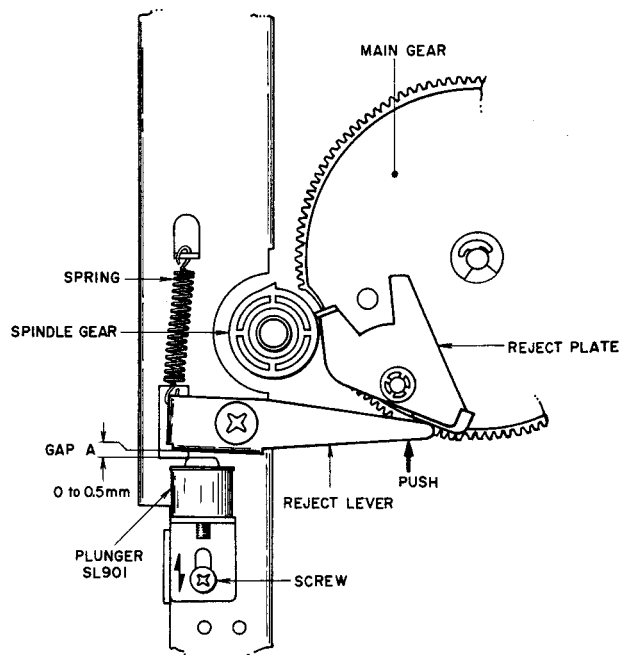


Fig. 27

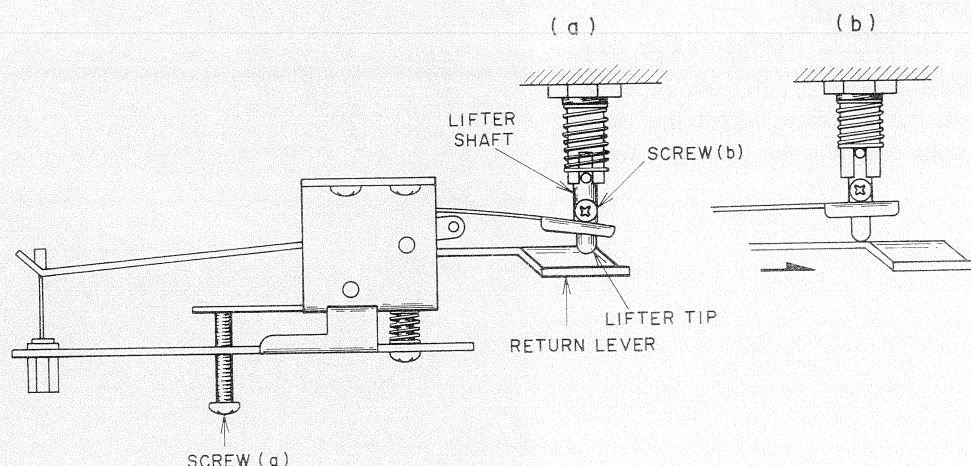
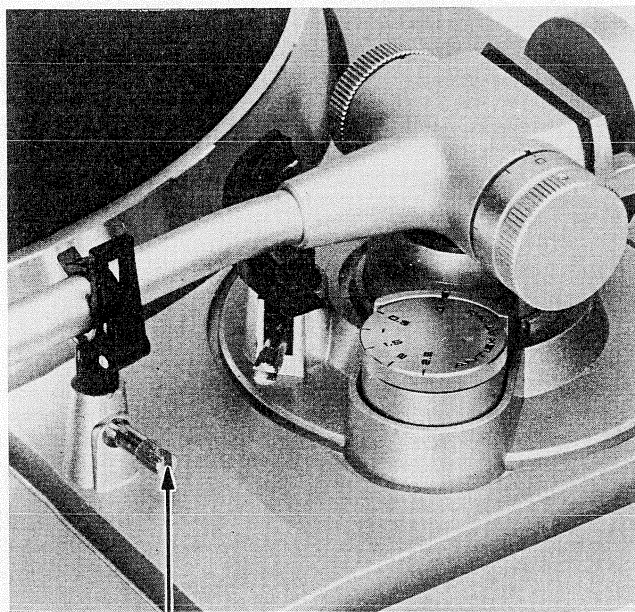
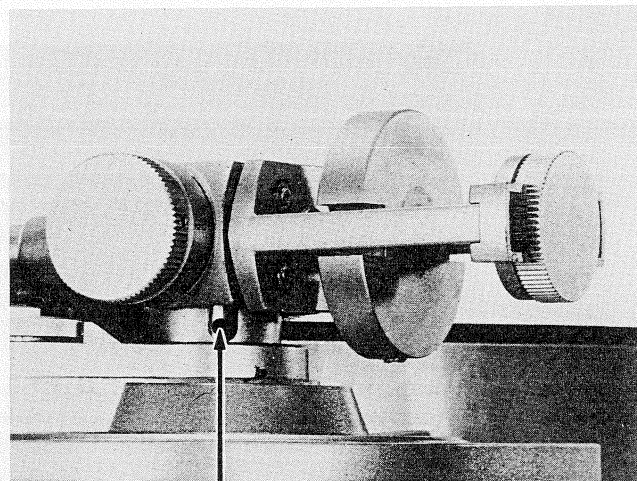


Fig. 28



SCREW C

Fig. 29



ADJUSTMENT SCREW

Fig. 30

3. TONE ARM LIFTER HEIGHT ADJUSTMENT (Refer to Figs. 28 and 29)

- 1) Turn the main gear by hand until the arm lifter is raised at auto-return (Fig. 28 (b)). Loosen screw (b) and push up the lifter shaft fully. Re-tighten screw (b) at the position where there is no gap between the return lever and lifter tip.
- 2) After assembly, place a record on the platter and adjust the arm lifter's height with screw (c) until there is an 8 mm gap between the stylus tip and record surface during auto-return. (The arm lifter switch should be set to ∇).

- 3) Release the auto-return and set the arm lifter switch to ∇ .

Adjust screw (a) through the adjustment hole on the rear cover until the arm lifter is fully raised.

4. TONE ARM HEIGHT ADJUSTMENT (Refer to Fig. 30)

The Tone Arm should be parallel with the record surface.

To adjust the arm height, insert the hexagon wrench into the adjustment hole (see Fig. 30) and turn. Adjustment of up to 5 mm is possible.

5. TONE ARM REST HEIGHT ADJUSTMENT (Refer to Fig. 31)

With the Arm Lifter Switch set to (▼), use the Tone Arm Height Adjustment Screw to adjust the Tone Arm Lifter to the same height as the Tone Arm Rest.

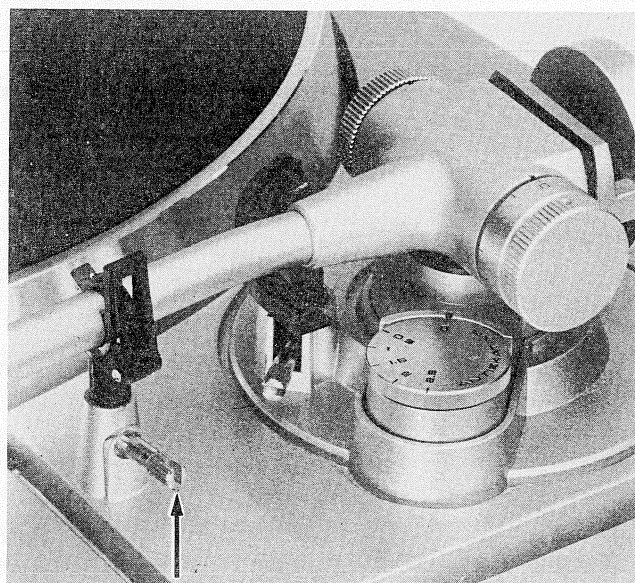


Fig. 31

AUTO-RETURN ADJUSTMENT SCREW CAP

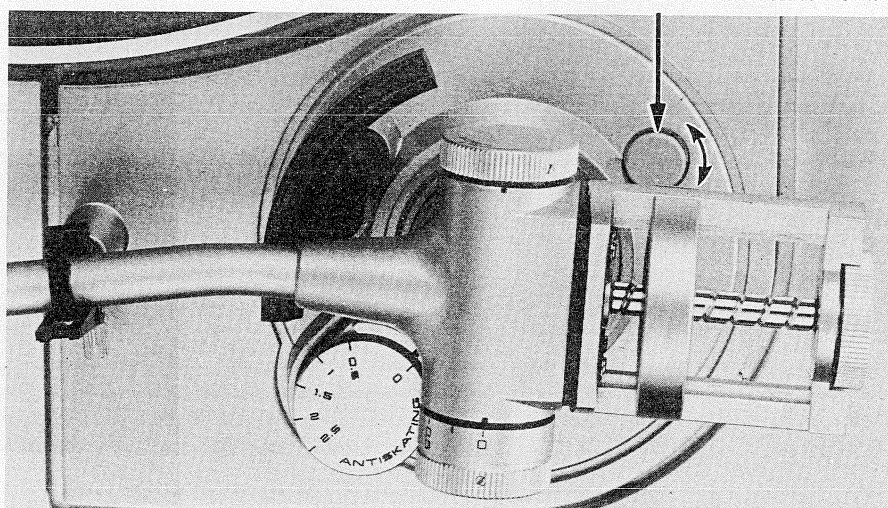


Fig. 32

6. AUTO-RETURN ADJUSTMENT (Refer to Figs. 32 and 33)

- 1) Turn the power switch ON and set the speed selector to 33-1/3 rpm.
- 2) Remove the auto-return adjustment screw cap.
- 3) Move the tone arm manually in the direction of the spindle and adjust the auto-return adjustment screw until there is auto-return when the stylus reaches the auto-return adjustment groove on the rubber mat.

NOTE: The auto-return adjustment screw is visible if the tone arm has been moved about 1 cm from the tone arm rest. Turn clockwise to alter the auto-return position towards the inside and counter-clockwise to alter to the outside.

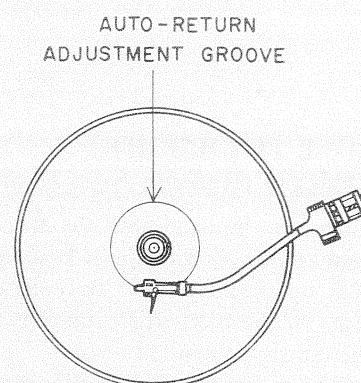


Fig. 33

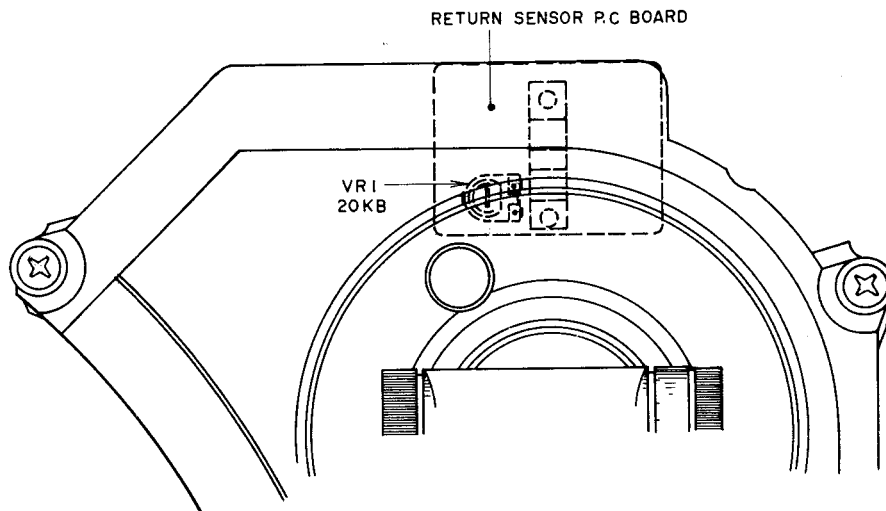


Fig. 35

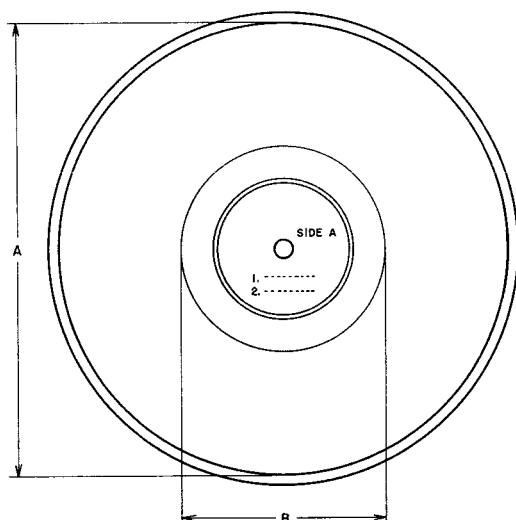


Fig. 34

7. RETURN SENSOR ADJUSTMENT

(Refer to Figs. 22, 34 and 35)

- 1) After adjusting V-6, playback a 30 cm or 25 cm (33-1/3 rpm) and 17 cm (45 rpm) records.
- 2) Adjust VR2 (200 kB) until the stylus is lifted up at an appropriate point on the lead-out groove.

NOTE: The range B or lead-out groove on which the stylus is to be lifted up is (Refer to Fig. 34):

- * 109 to 115 mm diameter for 30 and 25 cm disks.
- * 98 to 106 mm diameter for 17 cm disks.

CAUTION: Do not use any disk or phono sheet other than the one complying with the JIS standard or equivalent disk for this adjustment.

- 3) If the adjustment is not completed by VR2 (200 kB) turn VR1 (20 kB) on the Return Sensor P.C Board slightly and then re-adjust VR2 as in 2).

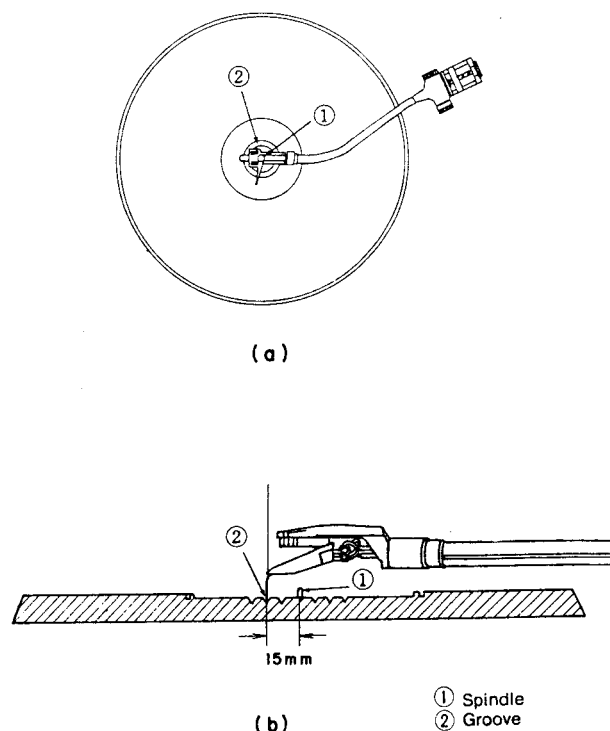


Fig. 36

8. OVERHANG ADJUSTMENT

(Refer to Fig. 36)

- 1) Disconnect the Power Cord.
 - 2) Move the Tone Arm to the center of turntable.
 - 3) Adjust the cartridge position so that the stylus is in line with the Middle Groove Ring.
- * The cartridge position can be adjusted by re-setting the Cartridge Re-setting Screws.



Fig. 37

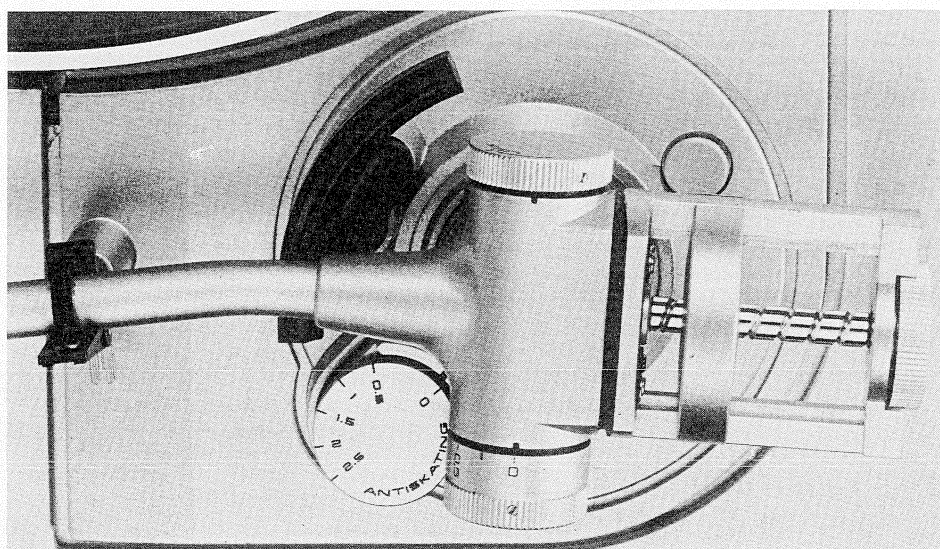


Fig. 38

9. STYLUS PRESSURE ADJUSTMENT (Refer to Figs. 37, 38)

- 1) Disconnect power.
- 2) Turn the Anti-Skating Adjuster and Stylus Pressure Adjuster to 0 and make sure the Arm Lifter Switch is set at (▼).
- 3) Unlock the Tone Arm and move towards the turntable.
- 4) Keep the Tone Arm stationary halfway between the Tone Arm Rest and the Turntable Platter and adjust the ballast until perfect horizontal balance is obtained. To increase ballast weight, turn

clockwise. To decrease weight turn counterclockwise.

- 5) Return Tone Arm to Tone Arm Rest. Lock Tone Arm and set stylus pressure weight recommended for your cartridge with the Stylus pressure Adjuster only. The adjustment range is from 0 to 2.5 grams.
* For AP-Q70C only: The stylus pressure for the supplied Ortofon LMB 12 stylus is 1.5 grams.
- 6) Set the Anti-Skating Adjuster to corresponding stylus pressure weight.

XII. CLASSIFICATION OF VARIOUS P.C BOARDS

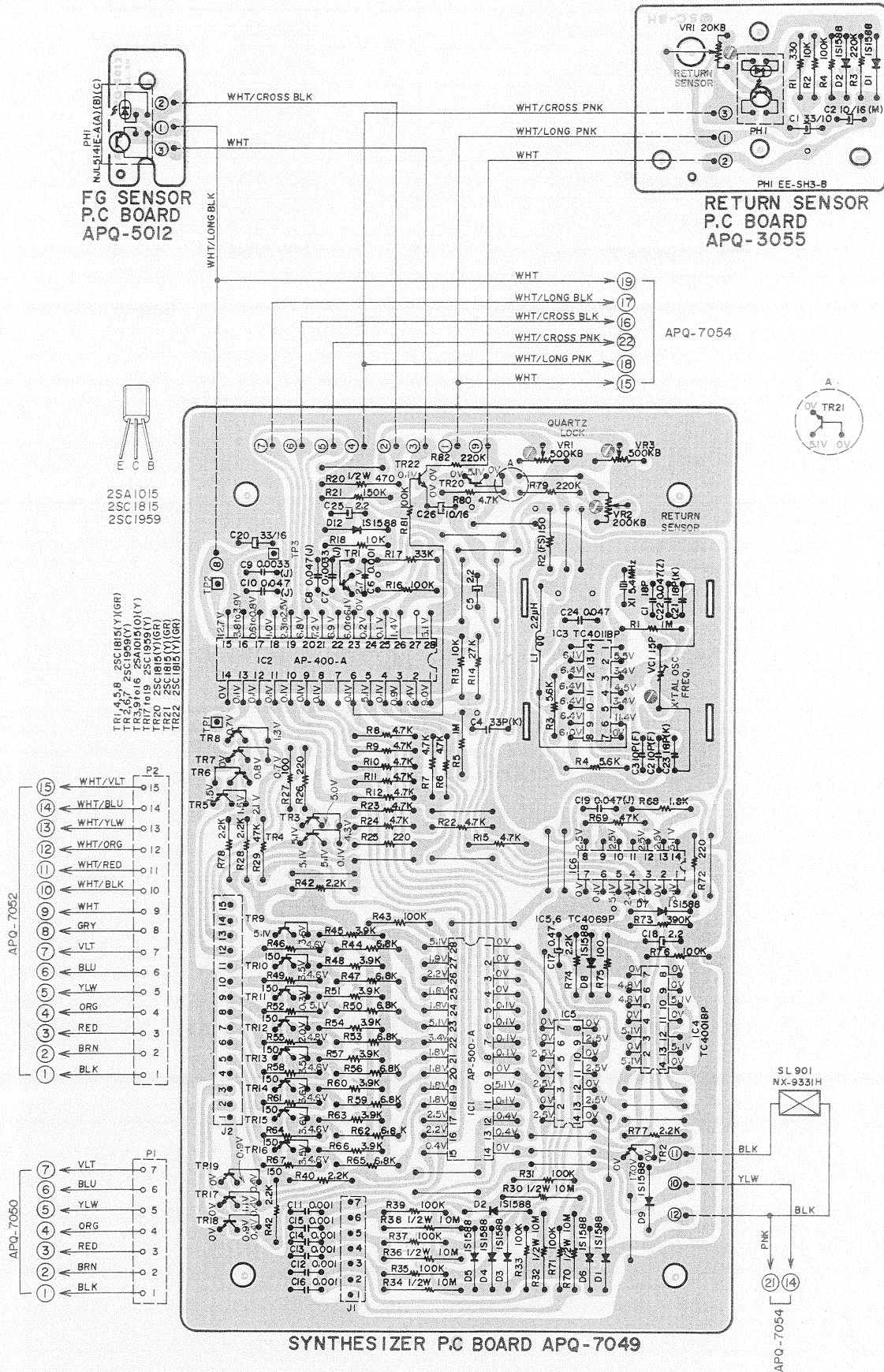
1. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

P.C Board Title	P.C Board Number
Touch Switch P.C Board (A)	APQ-7050
Touch Switch P.C Board (B)	APQ-7051
LED P.C Board	APQ-7052
Intermediate P.C Board	APQ-7053
Motor Drive P.C Board	APQ-7054
Synthesizer P.C Board	APQ-7049
FG Sensor P.C Board	APQ-5012
Return Sensor P.C Board	APQ-3055

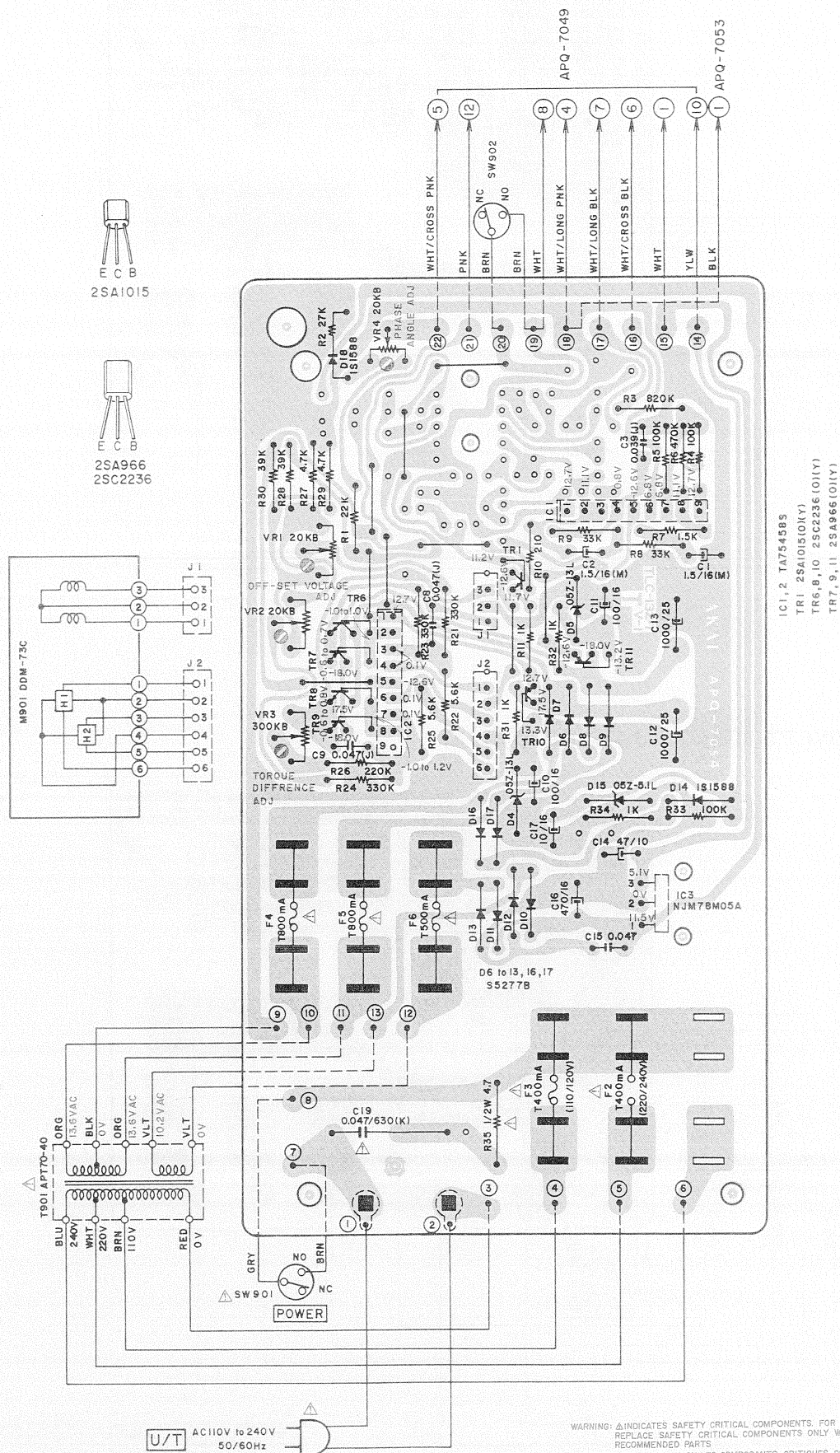
Chart 3

2. COMPOSITION OF VARIOUS P.C BOARDS

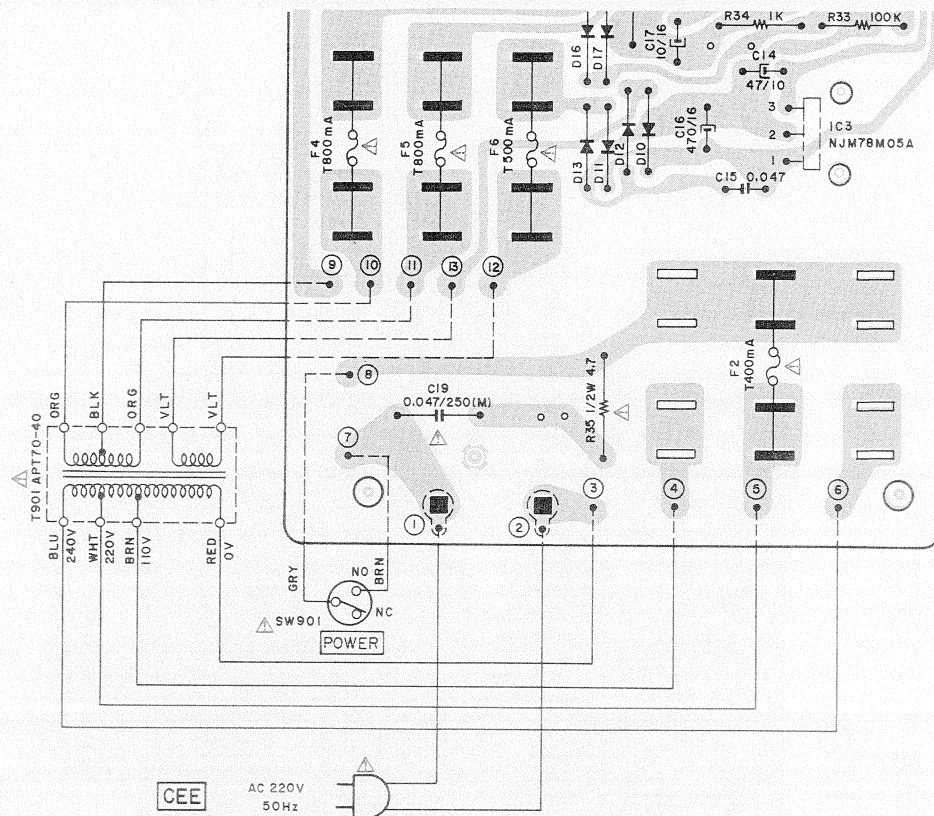
- 1) SYNTHESIZER P.C BOARD APQ-7049, RETURN SENSOR P.C BOARD APQ-3055 and FG SENSOR P.C BOARD APQ-5012



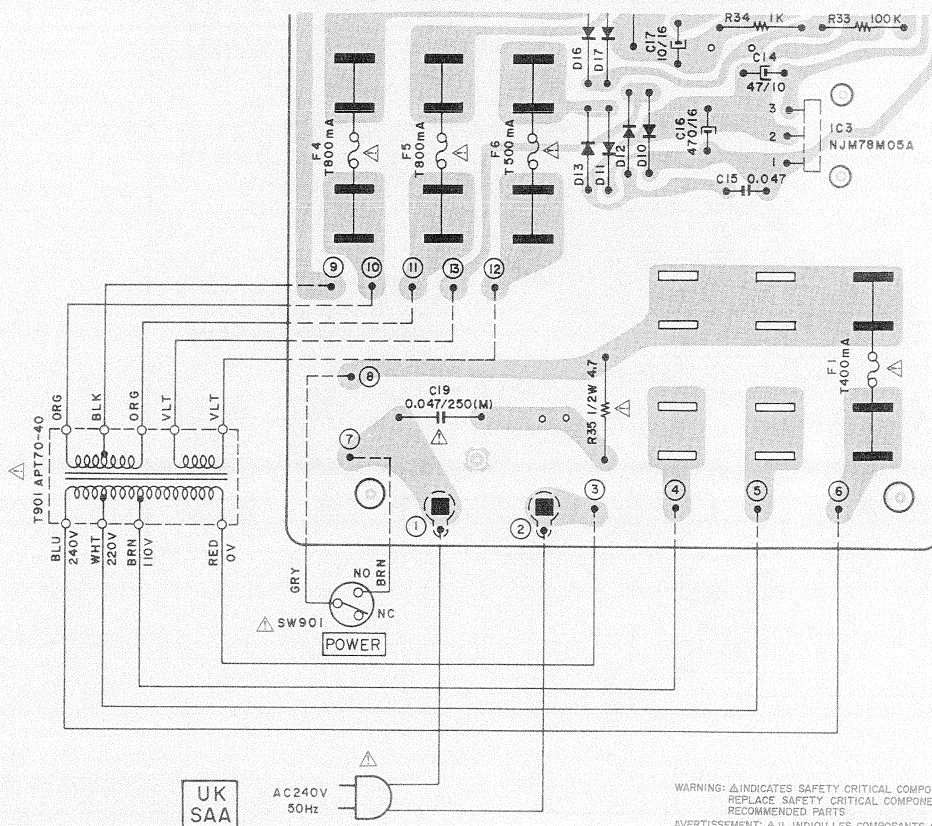
2) MOTOR DRIVE P.C BOARD APQ-7054 (U/T)



3) MOTOR DRIVE P.C BOARD APQ-7054 (CEE)

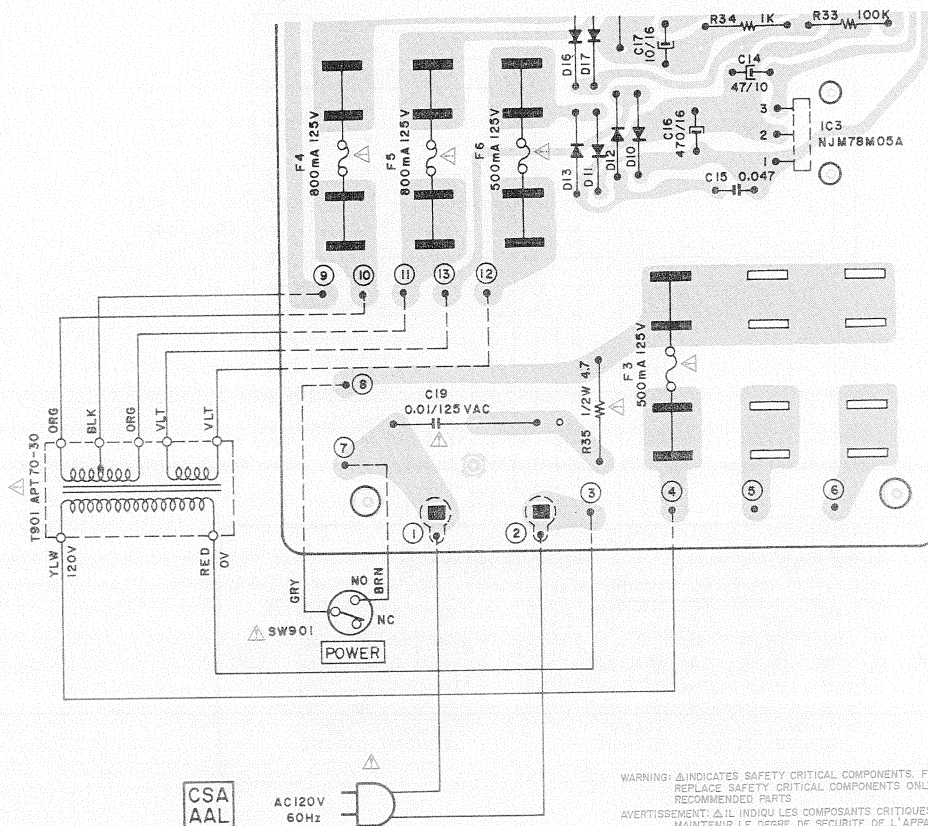


4) MOTOR DRIVE P.C BOARD APQ-7054 (UK, SAA)

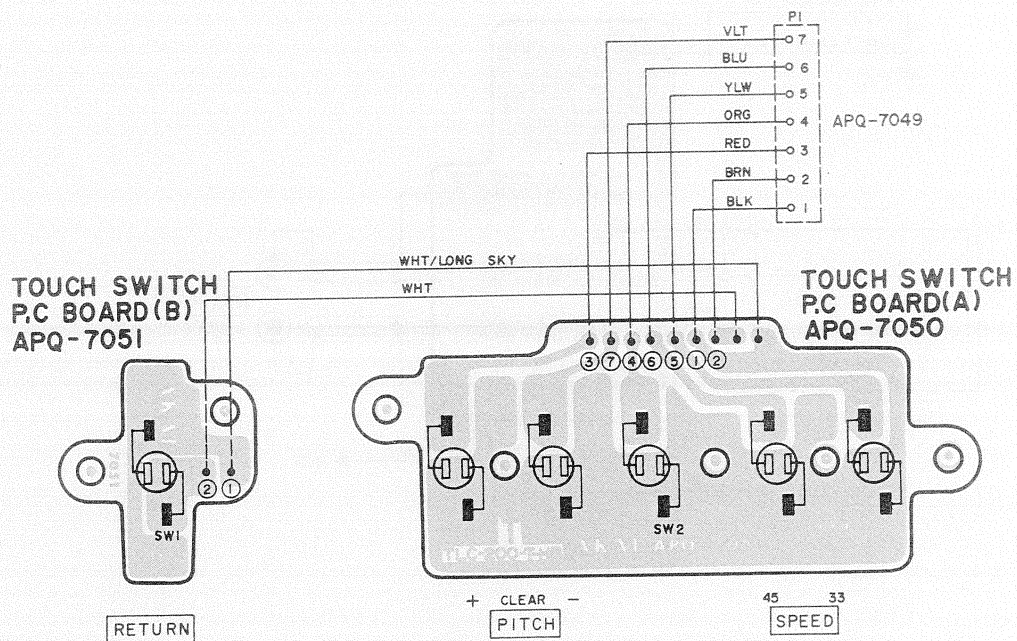


WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

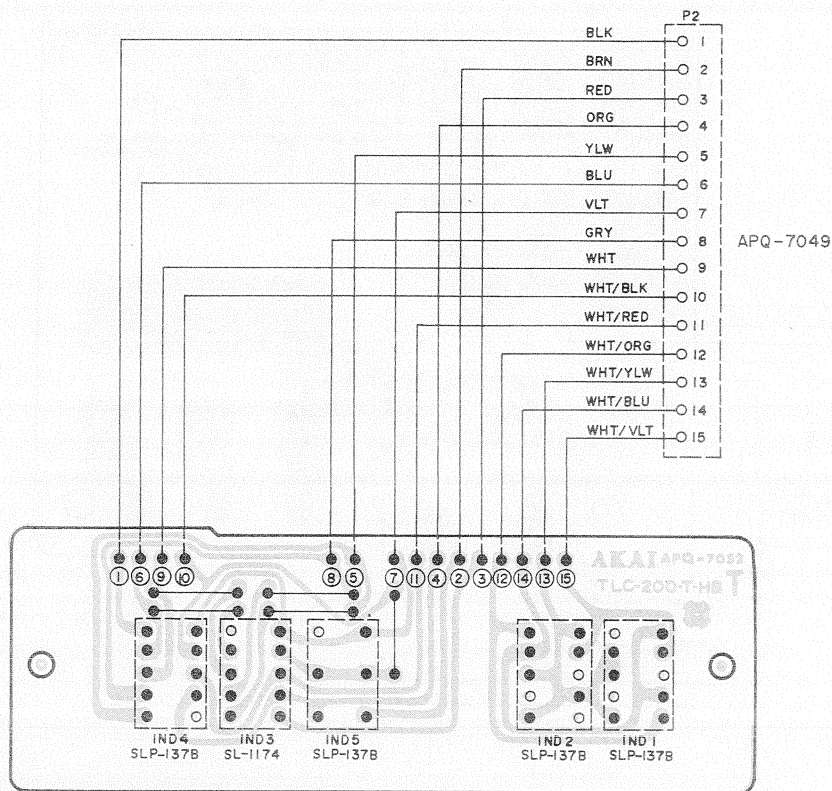
5) MOTOR DRIVE P.C BOARD APQ-7054 (CSA, AAL)



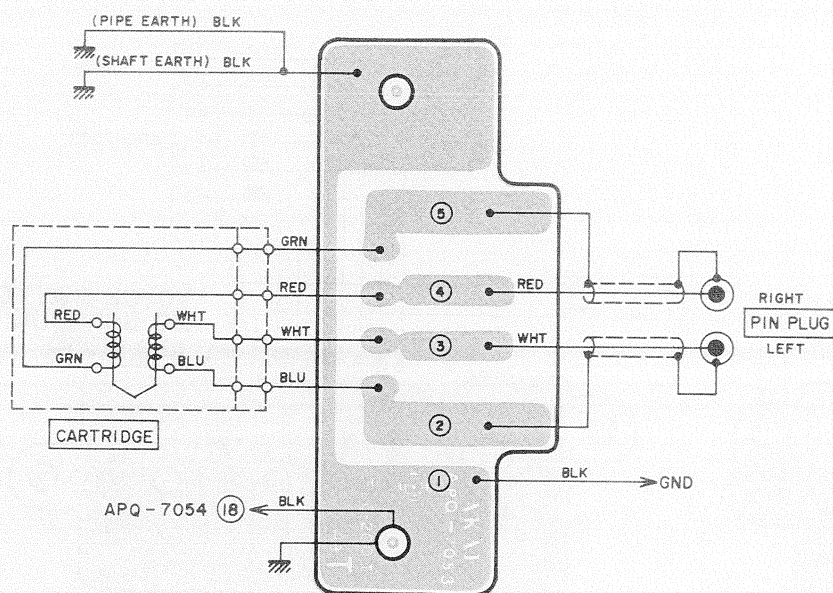
6) TOUCH SWITCH P.C BOARD (A) APQ-7050 and TOUCH SWITCH P.C BOARD (B) APQ-7051



7) LED P.C BOARD APQ-7052



8) INTER MEDIATE P.C BOARD APQ-7053



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SECTION 2

PARTS LIST

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1.	RECOMMENDED SPARE PARTS LIST	42
2.	SYNTHESIZER P.C BOARD (APQ-7049) BLOCK	44
3.	MOTOR DRIVE P.C BOARD (APQ-7054) BLOCK	44
4.	RETURN SENSOR P.C BOARD (APQ-3055) BLOCK	45
5.	ASSEMBLY BLOCK (1)	46
6.	ASSEMBLY BLOCK (2)	48
	INDEX	50

Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List

The reference number corresponds with illustration or photo number of that particular parts list.

This number corresponds with the Figure Number.

This number corresponds with the individual parts index number in that figure.

A small "x" indicates the inability to show that particular part in the Photo or Illustration.

Schematic Diagram Number of individual manufactured part.
(not required for parts order)

Quantity of particular part required.

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
	FLYWHEEL BLOCK #13			
12-115x	800425	Flywheel Block Assy. Comp.	RDG #13	1
12-116	244506	Flywheel Only	RD-233	1
12-117x	244754	Felt, Flywheel	RD-275	1
12-118	251324	Main Metal Case	RD-236	1
12-119	253080	Main Metal	RD-237	1

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of Components of the Schematic Diagram or Service Manual.
5. Please utilize separate "Common List for Service Parts" for Resistor Parts orders.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.
It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

- CAUTION:**
1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
 2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.
 3. Because parts number and parts unit supply in the Preliminary Service Manual (Basic Parts List) may be partially changed, please use this parts list for all future reference.

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

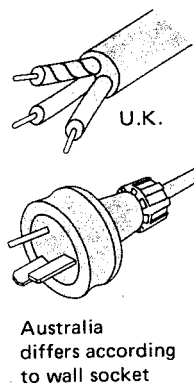
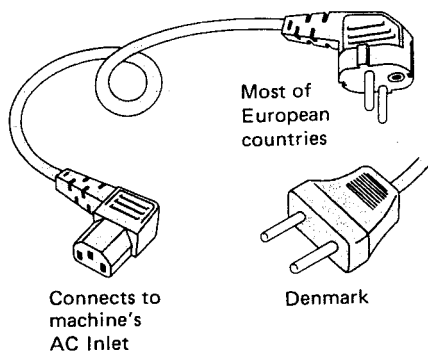
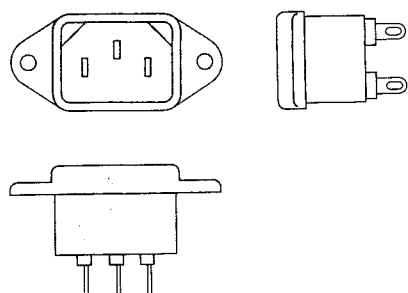
AVERTISSEMENT: ⚠ IL INDIQUE LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

AC INLET SYSTEM

This model is equipped with an AC INLET SYSTEM. Please refer to the AC INLET SYSTEM CHART below for the specific type. By the AC INLET SYSTEM, AC (mains) cord can be connected to and disconnected from the model because the model is provided with socket exclusively for AC (mains) cord on its main body. Please note, however, that certain models are not equipped with this system and has a built-in AC (mains) cord as before.

AC INLET SYSTEM CHART

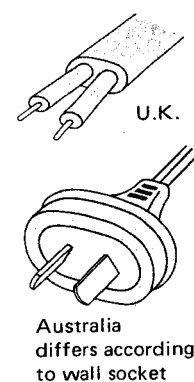
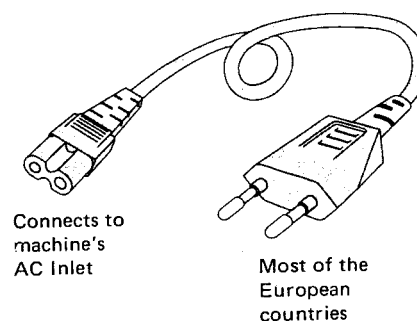
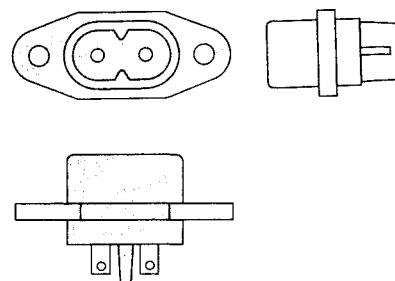
CLASS I



Picture 1
AC INLET
to be
installed
on machines

CLASS II

☐ This mark indicating double insulation will be attached to machine's rear panel



Picture 2
AC (mains)
cord

Parts List for AC (mains) Cord Set

Standard		Description	Type of AC Inlet	Parts No.
Class I	CEE	Cord Set CEE (3 cores)	3P	EW302993
	BEAB	Cord Set BEAB (3 cores)	3P	EW302994
	SAA	Cord Set SAA (3 cores)	3P	EW302996
	U/T	Cord Set U/T (3 cores)	3P	EW302646
Class II	CEE	Cord Set CEE (2 cores)	2P	EW638144
	BEAB	Cord Set BEAB (2 cores)	2P	EW302995
	SAA	Cord Set SAA (2 cores)	2P	EW302991
	U/T	Cord Set U/T (2 cores)	2P	EW302899

1. RECOMMENDED SPARE PARTS LIST

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare Parts Items.

Parts No.	Description	Notes
BA326393	Motor Drive P.C Board Comp. AP-Q70 (CEE)	CEE, UK, SAA
BA326392	Motor Drive P.C Board Comp. AP-Q70 (CSA)	CSA, AAL
BA326391	Motor Drive P.C Board Comp. AP-Q0 (U/T)	
BA326394	Synthesizer P.C Board Comp. AP-Q70	
BT326726	△ Power Trans. APT70-30	CSA, AAL
BT326727	△ Power Trans. APT70-40	U/T, CEE, UK, SAA
EC616342	Trimmer/C. CTY122D33 15PF	
ED326748	LED, 3 Segment SL-1174-03	
ED326747	LED, 1 Digit 7 Segment SL-1172-03	
ED306724	Silicon Diode S5277B	
ED321115	Silicon Diode 1S1588	
ED323211	Zener Diode 05Z-13L	
ED324194	Zener Diode 05Z-5.1L	
EF309390	△ Fuse 500mA 125V	CSA, AAL
EF309391	△ Fuse 800mA 125V	CSA, AAL
EF300585	△ Fuse (EAWK) 800mAT	U/T, CEE, UK, SAA
EF300590	△ Fuse (EAWK) 400mAT	U/T, CEE, UK, SAA
EF300591	△ Fuse (EAWK) 500mAT	U/T, CEE, UK, SAA
EI325557	IC AP-400-A	
EI326750	IC AP-500-A	
EI326702	IC NJM78M05A	
EI322599	IC TA75458S	
EI313797	IC TC4001BP	
EI304657	IC TC4011BP	
EI306726	IC TC4069P	
EI325529	Photo Interrupter EE-SH3-B	
EI325556	Photo Sensor NJL5141E-A (A) (B) (C)	
EI326741	Touch Sensor (1 mode)	
EI326742	Touch Sensor (5 mode)	
EI324532	X'TAL 5.4MHz	
EP320723	Plunger Assy NX-9331H	
ES316432	△ Micro SW. K-2 SEMKO	
ES325484	Leaf SW. MSW-0014	
ES326720	Micro SW. VV-S-01	
ES326746	Push SW. SUF12	
ET325501	Transistor 2SA1015 (O) (Y)	
ET306720	Transistor 2SA966 (O) (Y)	
ET307234	Transistor 2SC1815 (Y) (GR)	
ET325482	Transistor 2SC1959 (Y)	
ET306719	Transistor 2SC2236 (O) (Y)	

Parts No.	Description	Notes
EV315414	Semi-Fixed/Vol. D8 Axial 20kB	
EV321652	Semi-Fixed/Vol. V10K8-1-2 20kB	
EV326790	Semi-Fixed/Vol. V10K8-1-2 300kB	
EV326982	Semi-Fixed/Vol. V10K8-1-2 500kB	
EV326719	Semi-Fixed/Vol. (Metal Film) TM8K (PH) 20kB	
EV326718	Semi-Fixed/Vol. (Metal Film) TM8K (PH) 200kB	
EW306428	△ AC Cord (U/T)	
EW313884	△ AC Cord BASEC 2 Cores	UK
EW305691	△ AC Cord CUL	CSA, AAL
EW313882	△ AC Cord EC	CEE
EW313883	△ AC Cord SAA 2 Cores	
TP320719	Main Gear Assy AP-D30	

2. SYNTHESIZER P.C BOARD (APQ-7049) BLOCK

Symbol No.	Parts No.	Description	Schematic No.
2-1	BA326394	Synthesizer P.C Board Comp. AP-Q70	APQ-7089
2-IC1	EI326750	IC AP-500-A	45-8-444
2-IC2	EI325557	IC AP-400-A	45-8-435
2-IC3	EI304657	IC TC4011BP	45-8-232
2-IC4	EI313797	IC TC4001BP	45-8-348
2-IC5,6	EI306726	IC TC4069P	45-8-263
2-TR1	ET307234	Transistor 2SC1815(Y)(GR)	45-1-299
2-TR2	ET325482	Transistor 2SC1959(Y)	45-1-385
2-TR3	ET325501	Transistor 2SA1015(O)(Y)	45-1-328
2-TR4,5	ET307234	Transistor 2SC1815(Y)(GR)	45-1-299
2-TR6,7	ET325482	Transistor 2SC1959(Y)	45-1-385
2-TR8	ET307234	Transistor 2SC1815(Y)(GR)	45-1-299
2-TR9to16	ET325501	Transistor 2SA1015(O)(Y)	45-1-328
2-TR17to19	ET325482	Transistor 2SC1959(Y)	45-1-385
2-TR20to22	ET307234	Transistor 2SC1815(Y)(GR)	45-1-299
2-D1to9	ED321115	Silicon Diode 1S1588	45-3-62
2-D12	ED321115	Silicon Diode 1S1588	45-3-62
2-VC1	EC616342	Trimmer/C. CTY122D33 15PF	24-2-32
2-VR1	EV326982	Semi-Fixed/Vol. V10K8-1-2 500kB	36-10-255
2-VR2	EV326718	Semi-Fixed/Vol. (Metal Film) TM8K(PH) 200kB	36-28-11
2-VR3	EV326982	Semi-Fixed/Vol. V10K8-1-2 500kB	36-10-255
2-L1	EO328137	Peaking Coil 2.2μH (K)	23-1-396
2-X1	EI324532	X'TAL 5.4MHz	53-1-210
2-R2	ER327710	Carbon/R. F 1/4WS 150 ohms (J)	35-11-30

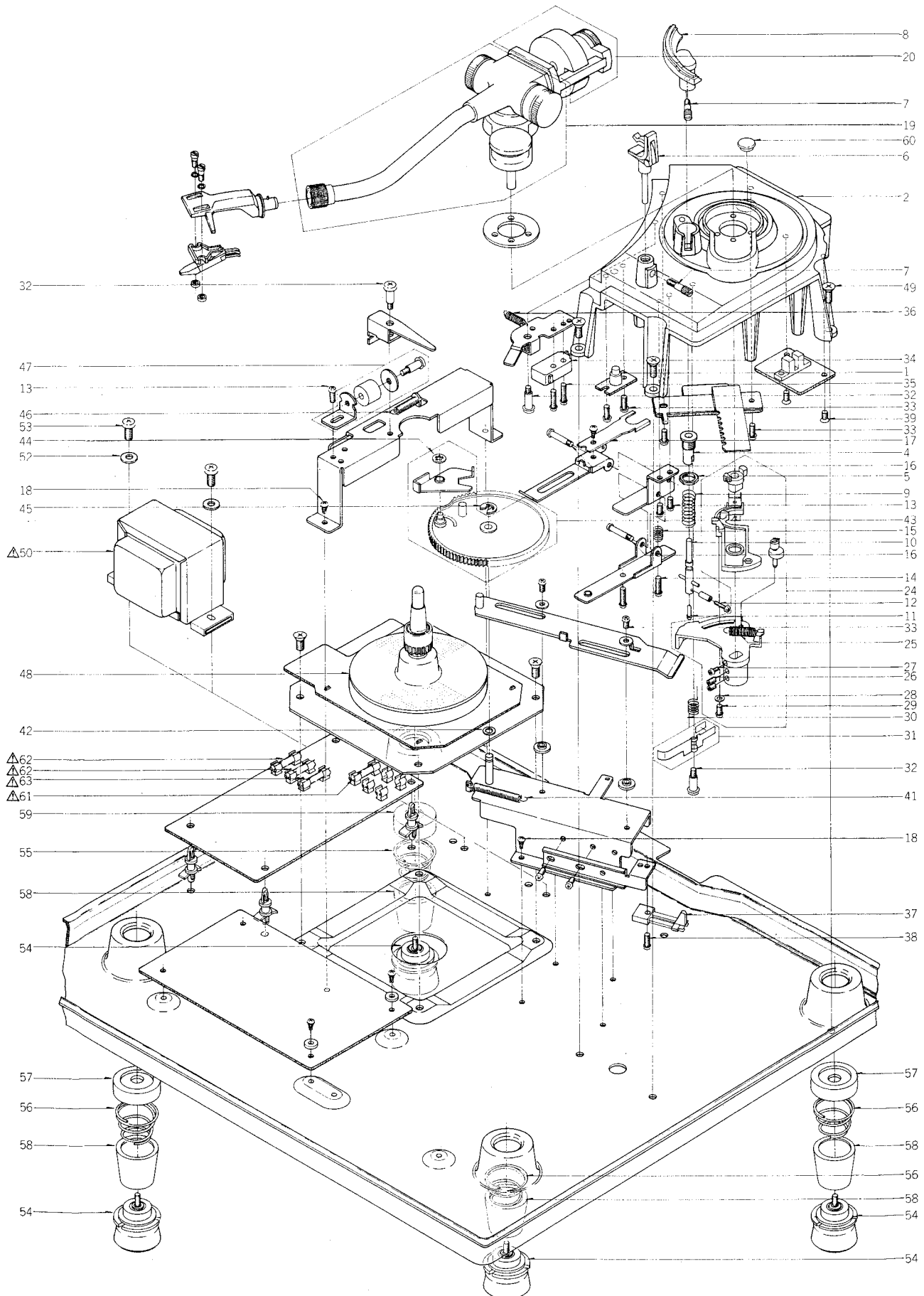
3. MOTOR DRIVE P.C BOARD (APQ-7054) BLOCK

Symbol No.	Parts No.	Description	Schematic No.
3-1	BA326391	Motor Drive P.C Board Comp. AP-Q70 (U/T)	APQ-7088
3-2	BA326392	Motor Drive P.C Board Comp. AP-Q70 (CSA)	APQ-7088
3-3	BA326393	Motor Drive P.C Board Comp. AP-Q70 (CEE)	APQ-7088
3-IC1,2	EI322599	IC TA75458S	45-8-415
3-IC3	EI326702	IC NJM78M05A	45-8-496
3-TR1	ET325501	Transistor 2SA1015(O)(Y)	45-1-328
3-TR6	ET306719	Transistor 2SC2236(O)(Y)	45-1-307
3-TR7	ET306720	Transistor 2SA966(O)(Y)	45-1-306
3-TR8	ET306719	Transistor 2SC2236(O)(Y)	45-1-307
3-TR9	ET306720	Transistor 2SA966(O)(Y)	45-1-306
3-TR10	ET306719	Transistor 2SC2236(O)(Y)	45-1-307
3-TR11	ET306720	Transistor 2SA966(O)(Y)	45-1-306
3-D4,5	ED323211	Zener Diode 05Z-13L	45-6-76
3-D6to13	ED306724	Silicon Diode S5277B	45-2-79
3-D14	ED321115	Silicon Diode 1S1588	45-3-62
3-D15	ED324194	Zener Diode 05Z-5.1L	45-6-76
3-D16,17	ED306724	Silicon Diode S5277B	45-2-79
3-VR1,2	EV321652	Semi-Fixed/Vol. V10K8-1-2 20kB	36-10-255
3-VR3	EV326790	Semi-Fixed/Vol. V10K8-1-2 300kB	36-10-255
3-VR4	EV326719	Semi-Fixed/Vol. (Metal Film) TM8K (PH) 20kB	36-28-11
3-C1,2	EC326788	Solid Aluminum/C. 1.5μF(M) 16WV	24-19-3
3-C12,13	EC316188	Elect./C. (Vert.) 1000μF 25WV	24-12-49
3-C19	EC302898	Δ Metal Polyester/C. 0.047μF(K) 630WV(U/T)	24-9-120
3-C19	EC325485	Δ MP/C. (Vert.) 0.047μF(M) 250WV (CEE, UK, SAA)	24-9-134
3-C19	EC314688	Δ Ceramic/C. DE7150 FZ 0.01μF(P) 125WV (CSA, AAL)	24-5-87
3-R35	ER536984	Δ Carbon/R. RD1/2 4.7 ohm(J)	35-9-9

4. RETURN SENSOR P.C BOARD (APQ-3055) BLOCK

Symbol No.	Parts No.	Description	Schematic No.
4-D1,2	ED321115	Silicon Diode 1S1588	45-3-62
4-VR1	EV315414	Semi-Fixed/Vol. D8 Axial 20kB	36-10-280
4-PH1	EI325529	Photo Interrupter EE-SH3-B	45-18-6

5. ASSEMBLY BLOCK (1)



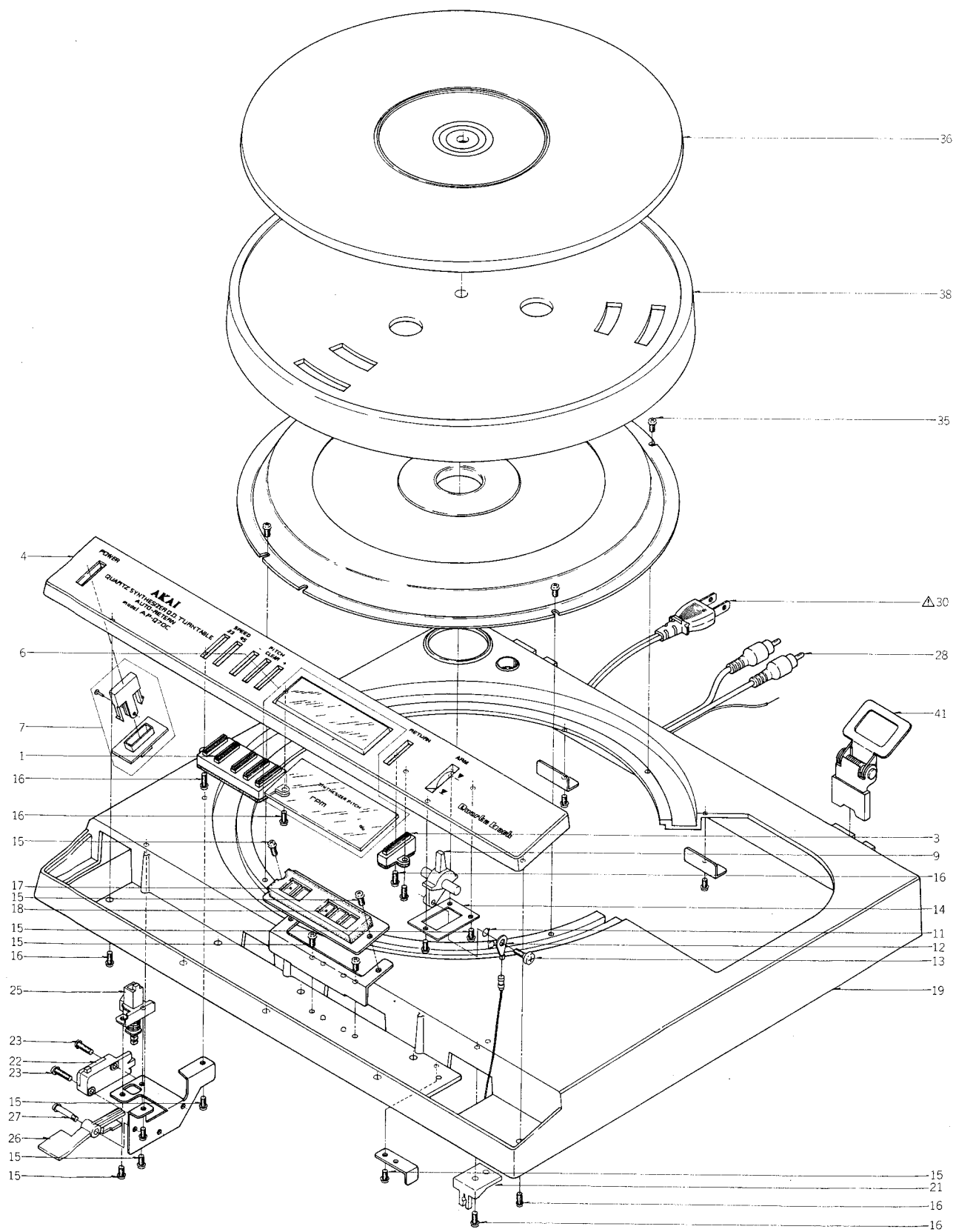
ASSEMBLY BLOCK (1)

Ref. No.	Parts No.	Description	Schematic No.
FG SENSOR P.C BOARD BLOCK			
5-1	EI325556	Photo Sensor NJL5141E-A(A)(B)(C)	45-18-3
ARM BASE BLOCK			
5-2	TP-326651	Arm Base	APQ-7001
5-3x	TP326652	Arm Base (BL)	APQ-7001
5-4	TP326653	Lifter Guide (A)	APQ-7002
5-5	ZW326792	Nut M8 D8×11×2t (P=0.75)	
5-6	TP326662	Arm Rest Part	APQ-7010
5-7	ZS326688	Decoration Screw	APQ-7039
5-8	TP326440	Lifter Part AP-Q70	APQ-7004
5-9	ZG326689	Lifter Spring	APQ-7040
5-10	TP326655	Lifter Shaft Part	APQ-7003
5-11	TP326693	Lifter Tip	APQ-7047
5-12	ZS302510	Screw, Pan 2×10	
5-13	ZS326789	S-Tight Screw, Pan 3×6 Black	
5-14	ZS419670	Screw, Pan 3×12	
5-15	ZG580533	Clamp Spring	TD-2046
5-16	ZS302767	Shaft Screw	AP-0074
5-17	ZG326660	Lifter Plate Spring	APQ-7008
5-18	ZS325495	Tapping Screw, #2 BR 3×6	
5-19	TP325969	Tone Arm Part AP-Q70	53-1-191
5-20	TP326736	Weight	53-1-199
5-21x	TP325970	Tone Arm (BL) Part AP-Q70-BL	53-1-195
5-22x	TP326737	Weight (BL)	53-1-200
5-23	ZS325503	Special Tapping Screw, Pan 3×12	7-1-70
5-24	TP320718	PU Plate Assy AP-Q70	APD-3073
5-25	ZG313071	Coil Spring T1-6.3/0.5-22.4	
5-26	ZS492917	Set Screw, Hexagon Socket 3×5 (Cup/P.)	
5-27	ZS356837	Screw, Pan 2×5	
5-28	ZW452395	Washer (SPC) D2.3×7×0.5t	
5-29	ZS669104	Tapping Screw, #2 Pan 2.3×6	
5-30	ZG325435	Brake Lever Spring	APD-3038
5-31	TP320748	Brake Lever Assy AP-D30	APD-3087
5-32	MS302757	Stopper Shaft	AP-0051
5-33	ZS302945	S-Tight Screw, Pan 3×8 (Black)	
5-34	ES326720	Micro SW. VV-S-01	25-1-64
5-35	ZS467796	Screw, Pan 2.6×12	
5-36	ZG313028	Coil Spring T1-5.0/0.32-20.0	
5-37	ES325484	Leaf SW. MSW-0014	25-10-44
5-38	ZS310337	Screw, Pan 2×8	
5-39	ZS200384	Screw, Countersunk 3×6	
SUB CHASSIS (A) BLOCK			
5-40	ZW556830	Washer (SPC) D3.1×8×1t (Black)	
5-41	ZG313005	Coil Spring T1-4.0-0.4-40.0	
5-42	ZW259773	Washer (Nylon) D4.1×7×0.5t	
5-43	TP320719	Main Gear Assy AP-D30	APD-3074
5-44	ZW653163	Retaining Ring CS Type 3	6-1-14
5-45	ZW290283	'U' Ring 2.85M	6-1-1
SUB CHASSIS (B) BLOCK			
5-46	ZG326705	Reject Spring	APQ-7057
5-47	EP320723	Plunger Assy NX-9331H	44-1-130
ASSEMBLY BLOCK			
5-48	BM326725	Motor Block DDM-73C	9-2-44
5-49	ZS427026	Screw, Countersunk 4×10	
5-50	BT326727	△ Power Trans. APT70-40 (U/T, CEE, UK, SAA)	38-4-803
5-51x	BT326726	△ Power Trans. APT70-30 (CEE, AAL)	38-4-802
5-52	ZW237857	Washer (SPC) D4.1×10×1t	
5-53	ZS424056	Screw, Pan 4×10	
5-54	TP326723	Insulator Part	3-18-27
5-55	ZG326683	Float Spring (A)	APQ-7036
5-56	ZG326684	Float Spring (B)	APQ-7036
5-57	TP326690	Damper (A)	APQ-7044
5-58	TP326691	Damper (B)	APQ-7045
5-59	TP326692	Damper (C)	APQ-7046
5-60	TP302504	Rubber Bush	AP-0043
5-61	EF300590	△ Fuse (EAWK) 400mAT (U/T, CEE, UK, SAA)	39-1-60

Ref. No.	Parts No.	Description	Schematic No.
5-62	EF300585	△ Fuse (EAWK) 800mAT (U/T, CEE, UK, SAA)	39-1-59
5-63	EF300591	△ Fuse (EAWK) 500mAT (U/T, CEE, UK, SAA)	39-1-60
5-64x	EF309390	△ Fuse 500mA 125V(CSA,AAL)	39-1-65
5-65x	EF309391	△ Fuse 800mA 125V(CSA,AAL)	39-1-65

When ordering parts, please quote Parts Number, Description and Model Number.

6. ASSEMBLY BLOCK (2)



ASSEMBLY BLOCK (2)

Ref. No.	Parts No.	Description	Schematic No.
TOUCH SW. P.C BOARD (A) BLOCK			
6-1	EI326742	Touch Sensor (5 mode)	25-13-2
6-2x	ZS447840	Tapping Screw, #2 BR 3x8	
TOUCH SW. P.C BOARD (B) BLOCK			
6-3	EI326741	Touch Sensor (1 mode)	25-13-1
OPERATION PANEL BLOCK			
6-4	SP326664	Operation Panel AP-Q70	APQ-7012,7013
6-5x	SP326665	Operation Panel AP-Q70-BL	APQ-7012,7013
6-6	TP326497	Window Part AP-Q70	APQ-7018
6-7	SB326498	Button Part AP-Q70	APQ-7024
6-8x	SB326499	Button (BL) Part AP-Q70-BL	APQ-7024
6-9	ML326666	Lifter Lever	APQ-7014
6-10x	ML326667	Lifter Lever (BL)	APQ-7014
6-11	ZG326682	Click Spring	APQ-7035
6-12	TP326721	Release	53-1-194
6-13	ZG326694	Lifter Screw	APQ-7048
6-14	ML326668	Lifter Lever Holder	APQ-7015
6-15	ZS326789	S-Tight Screw, Pan 3x6 (Black)	
6-16	ZS302945	S-Tight Screw, Pan 3x8 (Black)	
LED P.C BOARD BLOCK			
6-17	ED326747	LED, 1 Digit 7 Segment SL-1172-03	59-2-4
6-18	ED326748	LED, 3 Segment SL-1174-03	59-2-5
CABINET BLOCK			
6-19	BC326744	Cabinet AP-Q70	1-35-1
6-20x	BC326745	Cabinet AP-Q70-BL	1-35-2
6-21	MZ326673	Lifter Bracket (B)	APQ-7026
6-22	ES316432	△ Micro SW. K-2 SEMKO	25-1-59
6-23	ZS419670	Screw, Pan 3x12 (U/T, CSA, AAL)	
6-24x	ZS302778	Screw, Pan 3x15 (PC) (CEE, UK, SAA)	
6-25	ES326746	Push SW. SUF12	25-3-66
6-26	ML326677	Power SW. Lever	APQ-7030
6-27	ZS302767	Shaft Screw	AP-0074
RELAY P.C BOARD BLOCK			
6-28	EW326739	Pin Plug Cord 2P (Except A:AL)	26-10-24
6-29x	EW326738	Pin Plug Cord 2P UL (AAL)	26-10-23
ASSEMBLY BLOCK			
6-30	EW306428	△ AC Cord (U/T)	26-3-64
6-31x	EW305691	△ AC Cord CUL (CSA, AAL)	26-3-65
6-32x	EW313882	△ AC Cord EC (CEE)	26-3-66
6-33x	EW313884	△ AC Cord BASEC 2 Cores (UK)	26-3-67
6-34x	EW313883	△ AC Cord SAA 2 Cores	26-3-69
6-35	ZS306021	S-Tight Screw, Pan 3x6	
6-36	TP325443	Table Sheet (Except AAL)	APD-3046
6-37x	TP323593	Table Sheet (B) (AAL)	APD-3046
6-38	TP326728	Platter (B)	1-34-8
6-39x	BC320744	Dust Cover Part AP-D30	2-34-194
6-40x	SM325445	Name Plate	APD-3048
6-41	TP320745	Hinge (D) Part AP-D30	9-4-9
6-42x	ZW273756	Nut, #1 M3 (AAL)	



Bei Schalterwechsel aus Sicherheitsgründen nur Schrauben des gleichen Materials verwenden!

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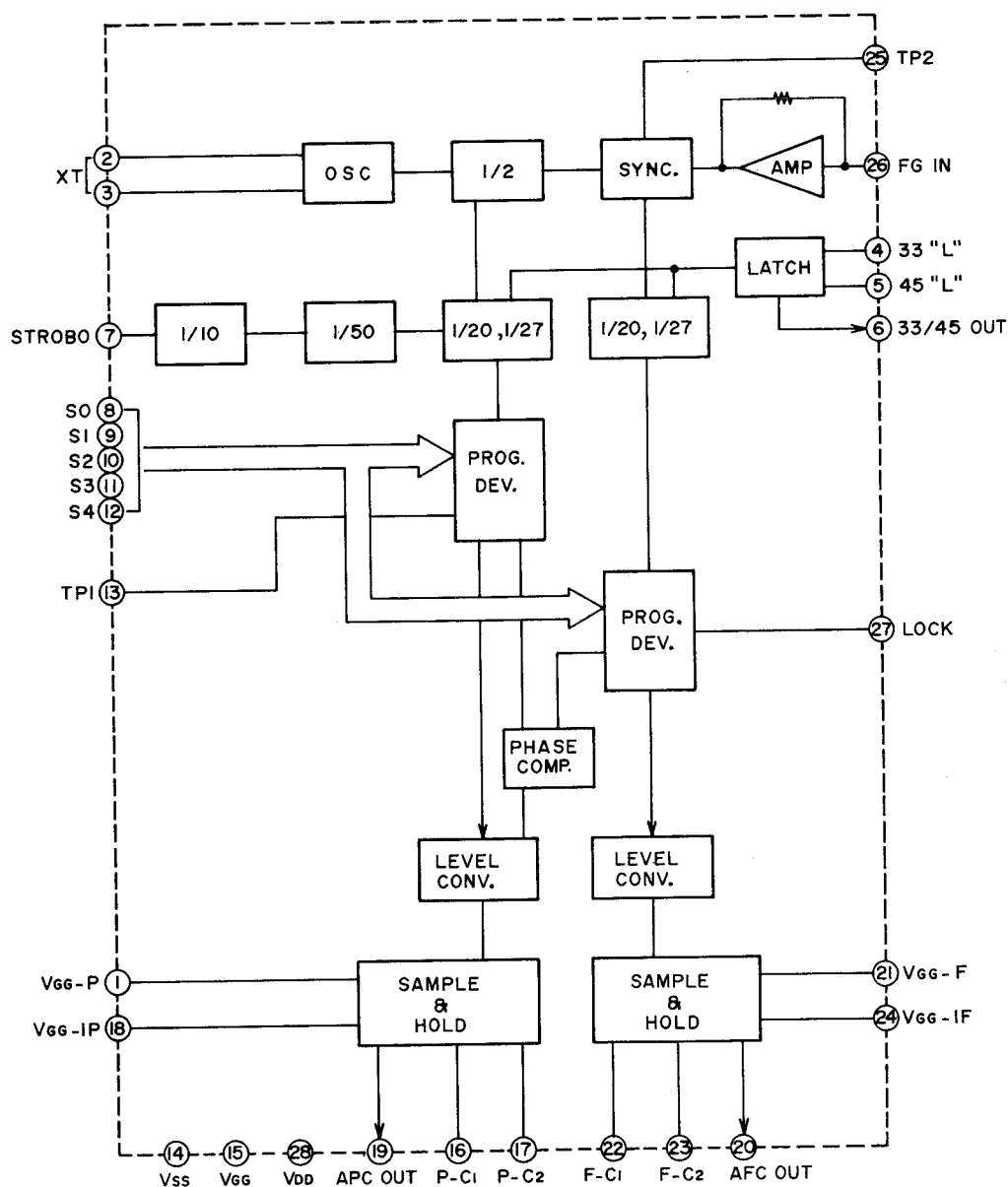
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BA326391	3-1	EW326739	6-28				
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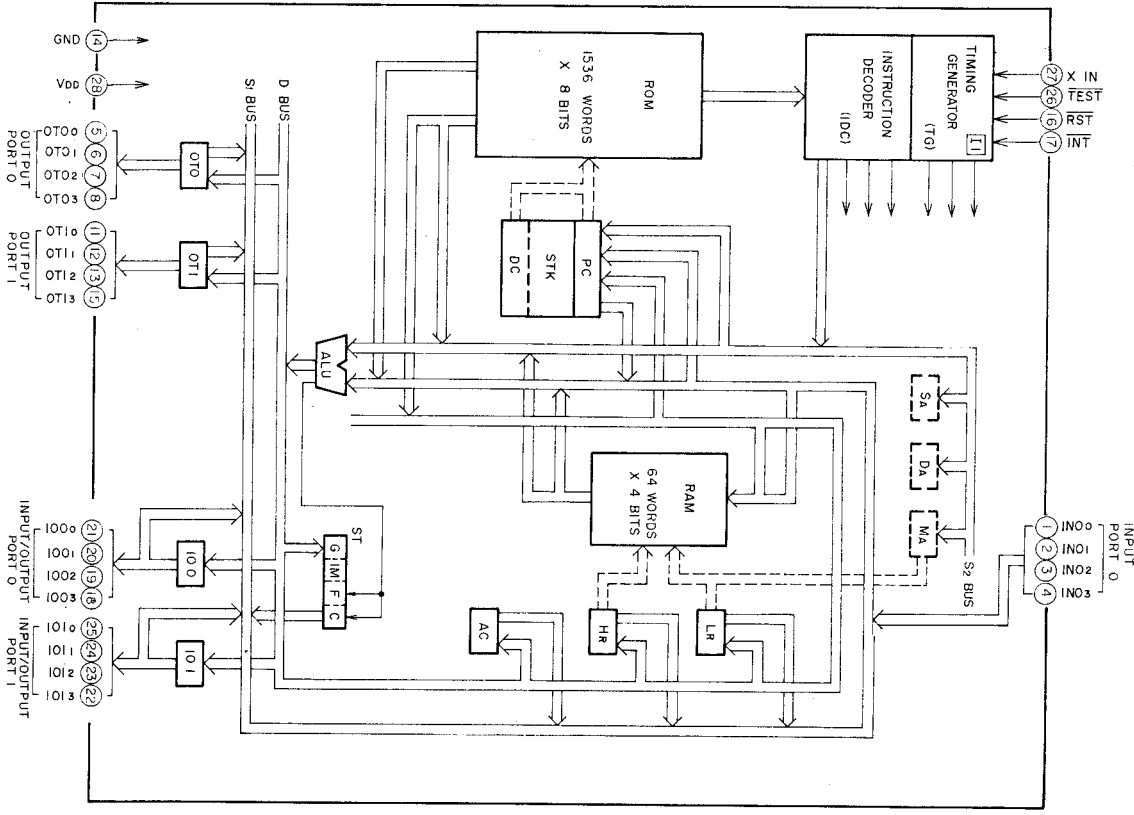
SECTION 3

SCHEMATIC DIAGRAM

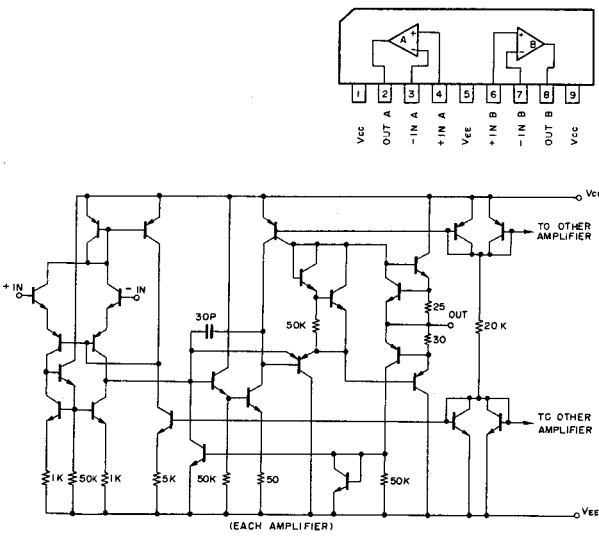
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2. AP-Q70/C NO. 1601056A SCHEMATIC DIAGRAM

AP-400-A

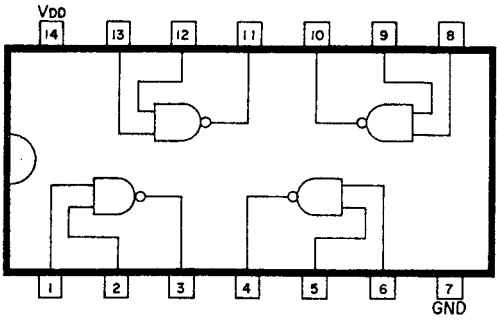
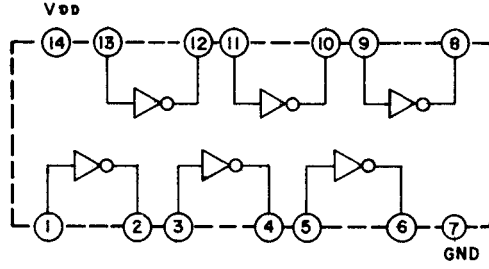




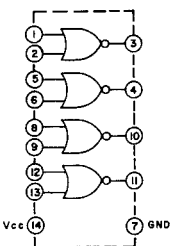
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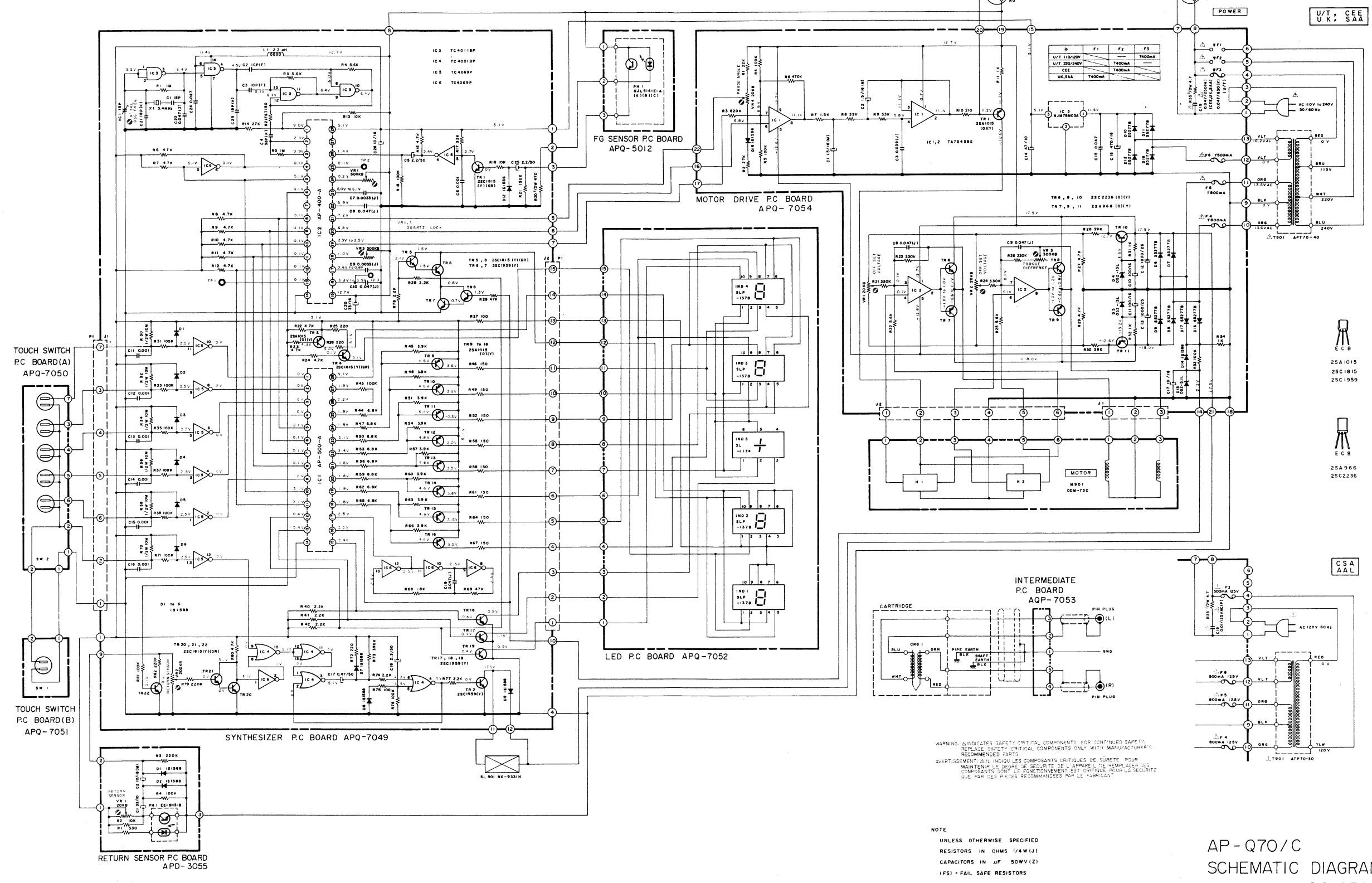
**TC4069P**

TC4001BP



AP-Q70/C

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WARNING: INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
AVERTISSEMENT: IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

NOTE
UNLESS OTHERWISE SPECIFIED
RESISTORS IN OHMS 1/4W (J)
CAPACITORS IN µF 50WV (Z)
(FS) = FAIL SAFE RESISTORS
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

AP-Q70/C
SCHEMATIC DIAGRAM
NO. 1601056A